

# The Mining Journal

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LONDON, AUGUST 19, 1955

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*Photo, by courtesy of  
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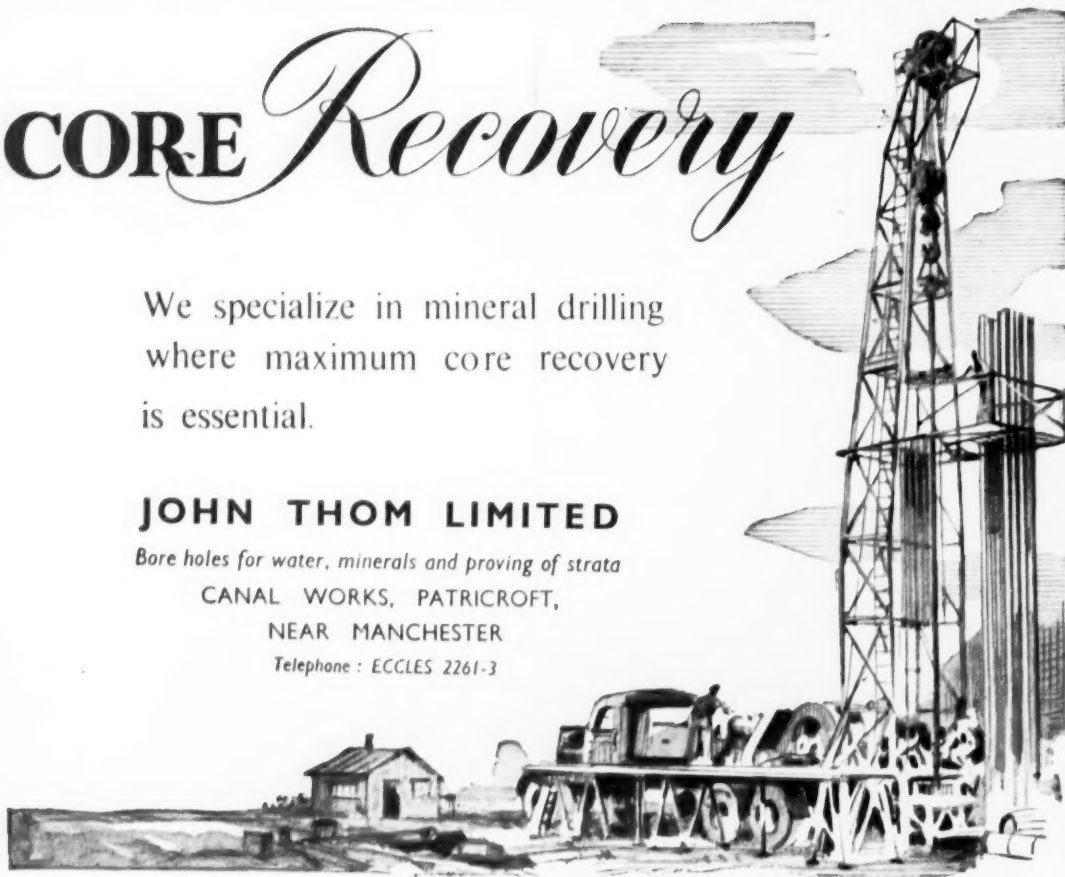
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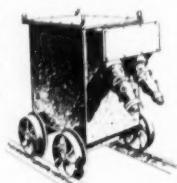
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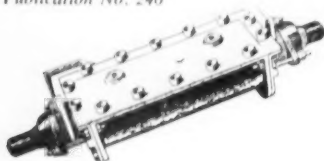
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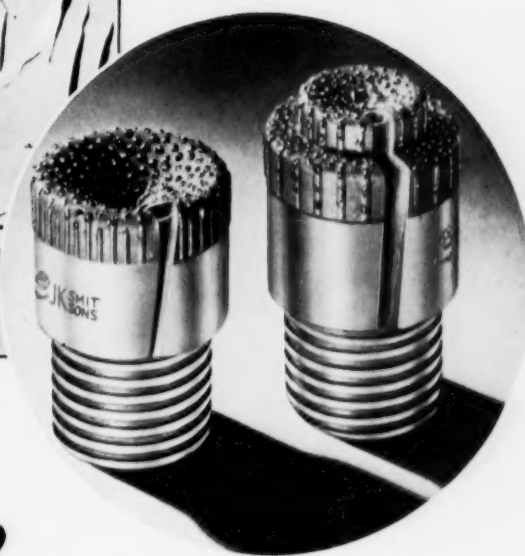
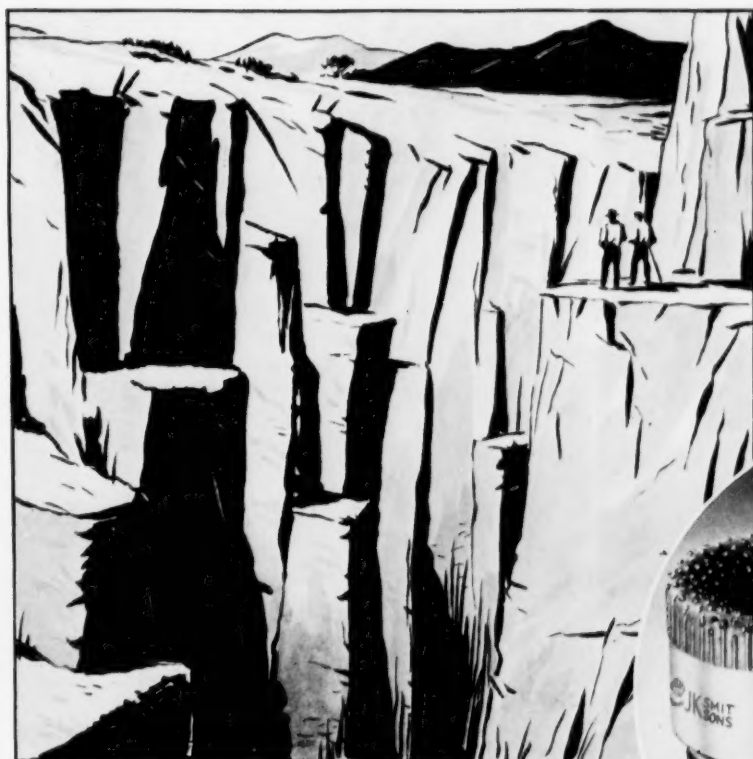
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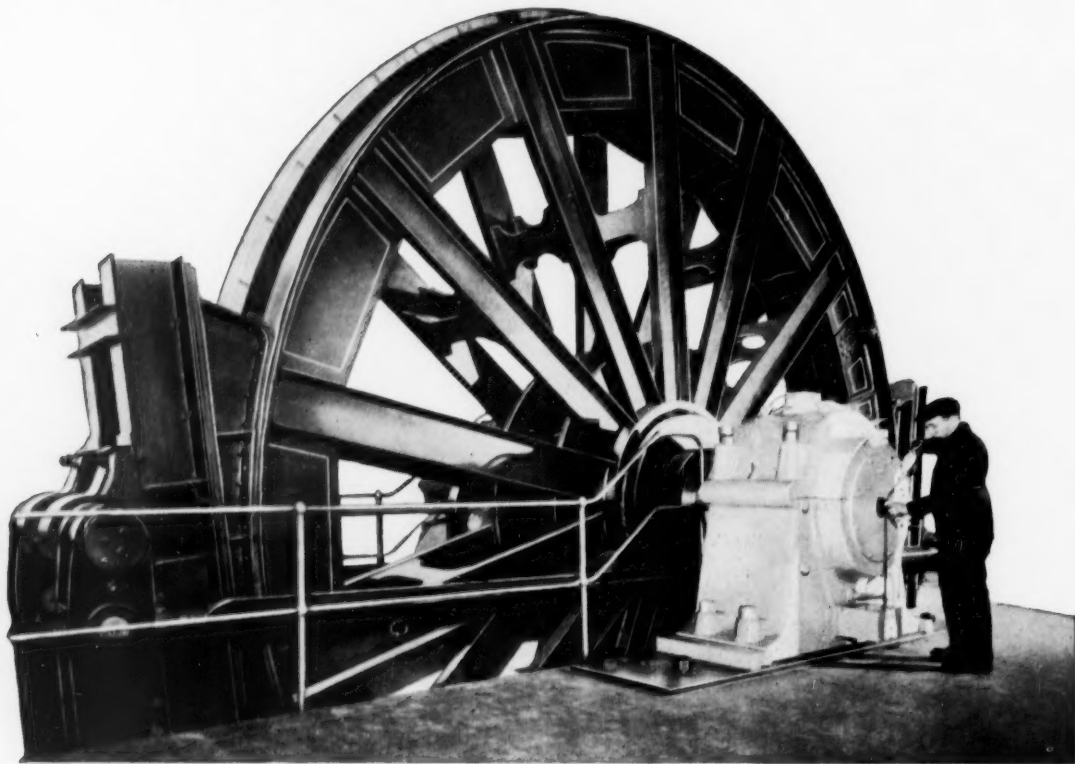
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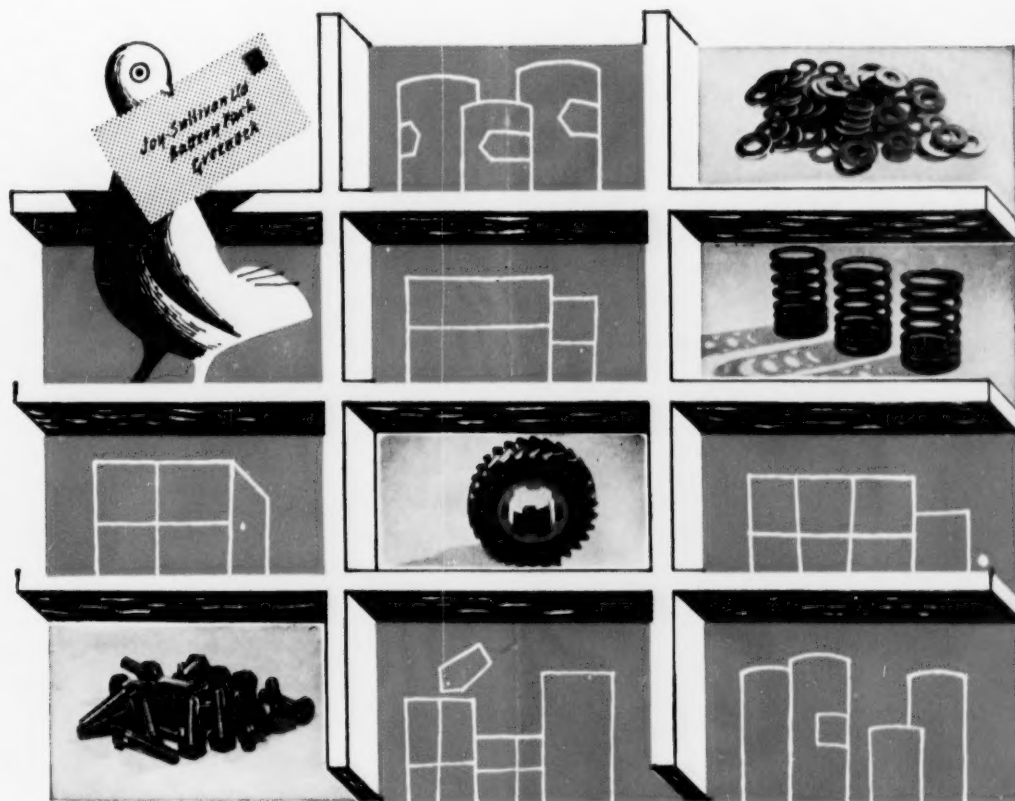
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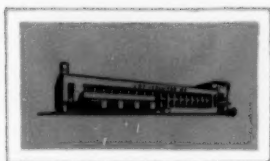


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## NOTES AND COMMENTS

### Revival of the Mexican Mining Industry

The Mexican mining industry is showing clear signs of reviving as a result of the increased demand for raw materials from the U.S. and the Western World.

The copper mining industry in particular has been strengthened by the intermittent strikes which have occurred during the past year in the U.S., Chile and Rhodesia and there are many who believe that the continued tight statistical position for copper throughout the world will result in the Mexican industry reaching the peak levels of 1929 and 1930 when copper production was approximately 80,000 tons.

*The Weekly Business Letter* published by the National Federation of Chambers of Commerce in a review of the copper situation pointed out that copper output at the beginning of world war II had slumped to 40,000 tons and that it was not until 1945 that copper production began to spiral upwards. After rising to an annual average of 60,000 tons, production fell away to 54,000 tons last year, the contraction in output being attributed to the extraordinarily high federal taxation and assessments. Moreover exports suffered as a result of the "protectionist" task policy which has been defended by the administration because it ensures that a very large proportion of the total production is available for domestic industry. Last year 30,000 tons were exported, the remaining 24,000 tons presumably being absorbed in the manufacture of national products for internal consumption. In spite of the swingeing burden of taxation copper producers are planning greater exports this year, a decision heavily influenced by the relatively high U.S. quotation for copper of 40 c. per lb.

Nor is it only the copper mining industry which is showing a healthy revival. The average monthly silver production from January to May this year shows that production advanced from 3,300,000 troy oz. to 5,100,000 troy oz. Similarly production of gold has shown a rise during the same period in its monthly average output from 32,293 oz. to 40,973 oz.

Only the production of lead has remained stationary so that with a booming mining industry the Mexican Chamber of Mines is increasing its pressure to persuade the Government to ease the tax burden on the argument that only by so doing can the long suffering mining industry reconstruct and build for a solid and prosperous future.

### New Jobs for the African on the Copperbelt

The agreement on African advancement on the Northern Rhodesian Copperbelt signed at the end of last month between the Rhodesian Anglo American group of companies and the Northern Rhodesia European Mineworkers' Union will result in the transfer to Africans of 24 categories of jobs at present undertaken by Europeans.

The categories of jobs to be handed over are generally considered as a reasonable step forward for the African. The attributes required to fill these positions vary greatly yet all the openings call for a relatively strong sense of responsibility, a high degree of reliability and an awareness of the importance of co-operation. The 24 categories of jobs, which will be transferred to the African so soon as the necessary administrative arrangements can be made, have been listed as screwing machine operator, sampler, mechanical loading and mechanical appliance driver, overhead crane driver (except converter aisle) tripper operator, shunter, underground storeman, pumpman (other than in main stations), anode take off operator, holding furnace caster, weigher and loader, crane chaser, screens attendant, cathode shearing machine operator, mobile crane operator (excluding steam cranes and those with mechanically operated swivelling jib), plan environs clean up handyman, smelter mason's handyman, trench digging handyman, parks and gardens handyman, sandfilling operator, concrete mixer attendant, underground pipe fitter, sub-level lasher and tankhouse inspector.

A perusal of the aforementioned list clearly reveals that some of the job categories demand very careful selection and for this reason it is believed that it may be some little time before all the positions are filled. To facilitate matters the Anglo American group of companies will establish training schools where the Africans can acquire the additional knowledge needed for these jobs and also for other jobs to be created which will not impinge on the present sphere of the Europeans.

The advantages to the European mineworker of the agreement could be substantial as the companies have undertaken to use "every endeavour" to persuade the government to provide adequate facilities for the training of Europeans in all technical and skilled occupations connected with the industry. In addition the companies have agreed to set up training schemes for union members to

fit them for more advanced positions and will finance suitable schemes designed to achieve this object.

#### Outlook for Mining in Egypt, the Sudan and Ethiopia

The recently published report of the United Kingdom Trade Mission to Egypt, the Sudan and Ethiopia led by Mr. G. C. R. Eley, deputy chairman British Bank of the Middle East and a director of the Bank of England provides an interesting—albeit brief—commentary on the outlook for the development of mineral resources in each of these three Middle East countries.

Egypt's known mineral resources are limited. Phosphate rock, manganese, talc, clay, gypsum, limestone, and magnesium sulphate are exploited commercially. There is iron ore at Aswan and deposits of ilmenite, lead and zinc have been found. And while other mineral occurrences are believed to exist it will not be until the detailed survey now being carried out has been completed that any assessment of the country's mineral wealth can be given. Oil, of course, is in a different category representing as it does Egypt's main source of power. Yet commercial production of crude oil in Egypt has so far been confined to the east and west shores of the Red Sea. Occurrences are small and are exhausted relatively quickly with the result that known reserves are small in relation to current production, thereby making continuous exploration a practical necessity.

Egypt is anxious to increase her production of crude oil to facilitate which legislation has recently been enacted amending the Company Law of 1947 and the Mines and Quarries Law of 1948 and concessions have been granted in the western and eastern desert, the Sinai-Peninsula and near the Gulf of Suez. Exploration is proceeding but the Trade Mission reports that the only area from which new discoveries of any substantial size are most likely is in the Western Desert where no extensive exploration has hitherto been carried out.

The known mineral resources of the Sudan, the Trade Mission describes as poor. Gold is mined on a small scale, iron ore and lead have been extracted in the past and limestone is quarried at Atbara. But other known mineral deposits have proved uneconomic. Broadly speaking, the geological outlook is not considered promising and large-scale mineral development seems a remote possibility. In fact, the Sudan Government recently accepted the recommendation of a geological consultant to the effect that while the fundamental work of geological mapping should continue a comprehensive mineral survey would not justify the expenditure involved. However, on available evidence it was recommended that a geophysical survey of the coastal plain south of Port Sudan should be undertaken, and that the coal occurrences at Dongola and the talc—magnesium deposits at Qala en Nahl near Gedaref should be re-examined.

Commenting on the natural resources of Ethiopia the Trade Mission points out that no comprehensive geological survey has yet been made and the extent of mineral deposits is virtually unknown. Nevertheless, the Ethiopian Government is anxious to encourage mining development and to this end recently set up a Mining Board which is responsible for the issue of mining concessions and has been charged with the responsibility of making arrangements for an air survey. No decision has yet been taken as to how the air survey should be tackled but the adoption of this technique provides the only practical solution to the difficult travelling conditions and the lack of communications.

Although Ethiopia's known mineral resources are best described as indications rather than proved commercial deposits a number of foreign companies have evinced interest in the possibility of prospecting for minerals so soon as the draft law governing this activity has been issued.

## The Rhodesias

(From Our Own Correspondent)

Salisbury, August 3.

Growing pressure is being brought to bear upon the Governments of the Federation to encourage the processing of minerals within the country. Railway bottlenecks and high freight charges are presently the two biggest obstacles to a more intensive development of a base mineral industry. Latest to urge processing of minerals in this country is Mr. A. G. Mells, President of the Rhodesian Smallworkers' and Tributaries' Association. In his annual report he said the industry could not continue to dig up raw materials and sell them at uneconomical prices for export in the raw state.

It is believed that already the Government and the Rhodesia Railways are being urged in some quarters to consider as a matter of urgency the possibility of overseas export of coal and coke. Now that the new line to Lourenco Marques is open to traffic—the first goods train left Bulawayo on August 1—one of the biggest obstacles to export trade has been overcome. If an export market could be secured it would maintain the level of coal and coke production and could provide a useful contribution to the country's external earnings.

Drilling for coal is still proceeding in Northern Rhodesia. It has been recently announced that a fifth borehole has been started in the Kandabwe area, 30 miles from Choma. Samples have been sent to London for analysis. Results of these will show whether Northern Rhodesia can have its own coal supply. All the boreholes so far sunk have intersected coal seam.

#### GOOD PROGRESS AT BANCROFT

Work at the Copperbelt's youngest mine, Bancroft, is going ahead steadily. One shaft is now down to about 1,200 ft. and a shaft at Konkola, seven miles away, and almost on the Congo border, is now down beyond 1,000 ft. In two years 119 houses have been built, and a school accommodating 200 children has been opened. There are now about 5,000 Africans in the mine township.

Three years after its production date on January 1, 1957, Bancroft will be the fourth biggest copper producer on the Copperbelt. It will double its initial output to bring its annual production to 85,600 l.tons of copper by 1960. Only the two Rhodesian Selection Trust mines of Mulfulira and Roan Antelope and Nchanga Consolidated in the Anglo American Corporation of South Africa group are at present producing more.

The Rhodesian Selection Trust Group has announced from its headquarters in Salisbury the formation of a new company to be known as The Rhodesian Selection Trust Exploration, Ltd., to examine mining propositions not necessarily associated with copper, within the Federation.

Its main purpose will be to provide machinery for the investigation of proposals made by individuals or organisations outside the R.S.T. Group's present fields of prospecting activities, and which may lead to new mining enterprises in the Federation.

Another fillip to Nyasaland's largely undeveloped mineral resources has been given by discovery of a vast deposit of calcium phosphate near Lake Chilwa at the southern end of the territory. Preliminary investigations have revealed a deposit of more than 3,000,000 tons. The ore body is believed to be perfectly suitable for open-cast working, and the quality is said to be better than the deposits already being worked at Borowa in Southern Rhodesia.



## New Gold Mining Areas in South Africa

In the following article our South African correspondent directs attention to several potentially promising mining areas—most of which are adjacent or contiguous to proven gold/uranium properties—where serious exploratory work or drilling operations are under way with a view to bringing new mines into production.

The development of the Orange Free State and Klerksdorp gold fields has now reached the stage where major capital expenditure programmes have been completed and most properties are earning profits. Although it may be some little time before dividends are paid on a large scale, already some of the loans made by mining and financial houses are being repaid. This brings into the foreground the question of what fresh fields for investment will be sought over the next few years.

In considering this, one must appreciate the background of the post-war development of the new areas. During the period of intensive development of mining lease areas, the financial, technical and physical resources of the mining industries were strained to the utmost. A similar position existed in respect of public services, such as transport, power and water. The mining houses, partly voluntarily and partly at the request of the Government, restricted operations as to the development of companies to relatively compact areas and curtailed exploratory work until these had reached the production stage.

As the position is now, it appears that renewed activity in respect of opening up new properties and undertaking more exploratory work is looming up in the very near future. The two most immediate schemes are the formation of companies to exploit the Sandpan area of Klerksdorp, which lies to the west of the Stilfontein-Hartebeestfontein area, and the Van den Heever Rust ground to the west of Freddie's Consolidated.

There are, however, other areas in the Free State where early drilling operations indicated the existence of underlying reef formations, but about which nothing was done during the period of intensive work in the central section. One of these areas lies to the east of the Virginia-Harmony area towards the town of Ventersburg. An indication of possible developments there was given early this month when the Mayor of Ventersburg said that there was likely to be a large gold mine opened in the vicinity. Drilling in the area up to 1952 did encounter reef formations at around 2,000 ft. and values of the A reef looked promising. Not much work has been done since but there is a fairly widely held view in mining quarters that the chances of a continuation of payable formations in this area and up in the direction of Kroonstad must be given serious consideration. The mineral rights in this area would accrue to J.C.I., Free State Development and New Consolidated Free State for the greater part.

### NORTH OF THE HARMONY-SAAIPLAAS AREA

To the north of the Harmony-Saaiplaas area lies the somewhat notorious Erfdeel-Dankbaarheid ground. It will be recalled that drilling results were quite encouraging, but they all became suspect following the salting scandal. Before anything can be done here, the whole area will have to be redrilled. An interesting development in this connection is the report that a young Afrikaans mining house, with very good financial connections and which has acquired coal and asbestos interests in recent years is negotiating with the present holders of the mining rights to acquire participation and undertaking a drilling programme which will cost somewhere in the neighbourhood of £500,000. This area has achieved increased significance since it was originally drilled, in that radiologging of the old boreholes has given indications of strong radioactivity.

Coming to the area situated to the south of St. Helena—President Brand, early drilling disclosed a number of payable values over quite a fair stretch of country. Further drilling is required to prove this area, but the pattern of boreholes existing at present suggests that there is a fair chance of the existence of economic mineralization.

Immediately north of the existing field, there does not seem any likelihood of developments in the foreseeable future. Apart from the disappointing values of the northernmost mines already in existence, it would appear that the reef formation goes down to very great depths. It does, however, come up again towards the Vaal River and sub-outcrops in the Klerksdorp area where it is being exploited by the new mines there. It occurs at very shallow depths on the south bank of the river, which is a drainage channel only and not a geological break.

A fair amount of drilling has been done here over the years, but all the results have not been made public. It is known, however, that some of the cores ran as high as 700 in. dwt. The bulk of the ground here belongs to J.C.I. through Free State Development, Western Holdings and the Union Corporation. The impression here is that the capital cost of exploring this district would not be abnormally high and, should results justify it, the opening up of a mining area would be modest.

### WESTERN ULTRA DEEP

Turning eastwards from Klerksdorp to the West Wits line, the major undertaking already in the advance planning stage and where work should start before the end of the year, is the Western Ultra Deep property which lies to the south of the Blyvoor—West Driefontein ground. In spite of the depth of the reef at around 10,000 ft., the indications are that high gold values exist in it. Firstly, there is the Carbon Leader, which has already proved itself, and the Ventersdorp Contact reef which also runs to good values though the mineralization is not quite so consistent. It is understood that one ultra-deep shaft will be put down initially and that this will be linked with West Driefontein's giant No. 5 shaft now being sunk.

In recent years a small but continuous drilling programme has been in progress in the westernmost section of the West Wits ground, known as the Conjoint Drilling Area. Results have not been startling, but the possibility of further mining operations there is by no means ruled out. At the far eastern end of the Witwatersrand there is the Bethal area which has been so much talked about but about which so little is really known. As matters stand at present it seems certain that two mines will be opened up before very long. According to reports preparations are being made to sink inclined shafts—the speediest and most economic way of opening up a shallow property. Exploratory work is continuing to the north of this ground. It was originally thought that the sub-outcrop ran roughly east to west, but it now looks as if it is from north to south. To the south, it is understood that mining houses, other than Union Corporation are having a "look see," and it is regarded as significant that the Government has proclaimed a very large area under the Natural Resources Development Act—which deals among other things with the planning and development of new goldfields—stretching from the known potential Bethal-Trichard area down to the south into the Heidelberg-Nigel districts.



# Geochemical Exploration Practice in the United States

The use of sensitive analytical methods to detect low concentrations and hidden orebodies has been developed since the decade preceding the Second World War. The oil producing companies of the United States showed a marked interest in the method and immediately following the cessation of hostilities a geochemical prospecting unit was created in the Mineral Deposits Branch of the United States Geological Survey. Eventually, the Geochemical Exploration Section was formed which is not only concerned with geochemical prospecting but also with the fundamental principles underlying the distribution, migration and concentration of elements within the earth. The following article presents a précis of the work undertaken by the Section. The article is condensed from a paper entitled *Geochemical Exploration Work of the U.S. Geological Survey*, by T. S. Lovering, U.S. Geological Survey, presented before the Centenary Congress of the Société de l'Industrie Minérale in Paris during June, 1955. Publication of the paper was authorized by the Director of the Survey.

Typical of the research work of chemists and geologists are the problems being currently investigated; namely:

First, field and laboratory studies of various rapid and sensitive analytical methods suitable to the determination of traces of metals and other minor elements in various materials such as rocks, soils, plants, and waters.

Second, the relation of geochemical anomalies in plant materials to the geochemical distribution of elements in soils surrounding the plants.

Third, a study of the dispersion halos in transported sedimentary cover such as glacial drift and alluvium over known orebodies.

Fourth, a study of the behaviour of metals in the weathering cycle including the factors influencing the decomposition of primary minerals in different climates and those affecting the migration of supergene metal-bearing solutions through transported cover and through bedrock.

Fifth, the normal distribution of metals in fresh igneous rocks and their component minerals, and in adjacent country rock in a well-established differentiation series where the related mineral deposits are of minor importance.

Sixth, a thorough study is being made of the dispersion of metals in primary halos in the wall rock of different types of ore deposits with due consideration given to the lithology of the wall rock, its alteration, and the character of the primary ore itself.

Seventh, regional and local studies of the metal content of water in mineralized and barren areas is being carried on.

Out of the current work and that which has been done in the past, certain general principles seem to be merging that may be of sufficient interest to warrant consideration.

## GENERAL PRINCIPLES

It is gradually becoming apparent that there is a marked variation in the background of an element within certain broad regions, which may be considered geochemical provinces or metallogenetic provinces. In addition to regional variation there is, of course, a substantial variation in background of chemically dissimilar rocks. It has become evident that the figures appropriate for background in any region must be established locally by sampling the rocks away from areas of mineralization.

The general distribution of elements in a given rock fortunately follows a law that has been stated recently by Ahrens (1954); elements in rocks of a given type follow a lognormal distribution. When plotted on semilogarithmic paper the curve showing the number of analyses plotted against the concentration of the element is a symmetrical curve with a sharp inflection at the peak value.

In studying patterns of anomalous values, it has been found that the threshold of significance is commonly that of approximately twice the value of this peak for the background. It has been found also that the significance of the

geochemical anomalies is well brought out by using a geometric ratio for isograms. In contouring geochemical results the different contours would represent 2, 4, 8, 16 and 32 times the background values rather than 2, 3, 4, 5 and 6 times the background. Any study of a primary anomaly should be based on a good knowledge of the geology of the mineral deposits.

In studying primary halos it is of great importance to establish the angle or rake of the anomaly at depth—the third dimensions of the geochemical anomaly. This should be done with preliminary short-hole drilling before a major drilling campaign is undertaken. The interpretation of geochemical anomalies must be tied to local conditions wherever this is possible.

## CURRENT INVESTIGATIONS

The Geological Survey has investigated primary halos above and near ore deposits in the Tintic district, Utah, where numerous blind lead-zinc-copper orebodies have been explored and where some of the blind ore cuts pre-mineral fractures that reach the surface. The work of H. Almond and H. T. Morris (1951) showed that an anomaly with good contrast was obtained for zinc and copper in an altered extrusive rock 350 ft. to 500 ft. above a horizontal pipe-like orebody in the underlying limestone where the extrusive rocks are cut by a fracture zone related to a strong pre-mineral cross fault. Away from the anomalous area the extrusive rocks showed a consistent background value not only in unfractured areas but also over the pre-mineral cross fault.

Work by Morris and Lovering (1952) in the same district showed that the heavy metals moved only a short distance away from the walls of orebodies in limestones. Commonly, lead and zinc diminished rapidly and reached a background value 6 to 10 ft. from the edge of massive sulphide ore in unfractured limestone or dolomite, but in a few localities values above background were found as much as 20 ft. from the orebody. Indeed, in one place where sampling was carried on in a crosscut to discover the pattern of dispersion away from an orebody, a sharp rise in the lead value at the face of the crosscut led to the conclusion that an orebody was nearby. This crosscut was extended later and the edge of a previously unsuspected orebody of considerable magnitude was found about 12 ft. ahead of the previous crosscut. More than 12,000 tons of ore averaging 6 per cent lead, 7 per cent zinc and 7 ounces of silver was taken from this body, the presence of which was suggested by geochemical sampling in the exploratory drift.

Anomalies of surficial origin—secondary anomalies—result from the weathering of rocks and ores or material dispersed from the ore deposit by glacial ice, moving water, or by slide and creep (colluvium), and include most of the discoveries credited to successful geochemical prospecting to date.

Chemical mobility is a measure of the tendency of an

element to be dissolved in the zone of weathering and to migrate away from the ore. Some minerals resist weathering or alter to other compounds *in situ*, and therefore have a low index of mobility. At the other extreme are the minerals that decompose and yield readily soluble compounds, which may remain dissolved in ground water, surface water, and their ultimate resting place the ocean; elements such as these have, of course, the highest degree of mobility. Intermediate between the two extremes are minerals containing elements such as zinc and copper that have a strong tendency to go into solution and to migrate an appreciable distance from the original deposit before again precipitating. The character of the bedrock, the pH of the solution, and various other factors determine the distance to which such elements move.

### MOBILITY OF METALS

In general, gold, lead, tin, iron, manganese, arsenic and antimony are relatively immobile and tend to concentrate in residual soil; uranium, cobalt, nickel, and zinc are much more mobile and are usually impoverished in gossans. Copper, silver, molybdenum, and tungsten are erratic in their behaviour and in some areas are enriched and in others leached.

In contrast to the chemical mobility touched on above there is also the difference in mechanical mobility where minerals of varying hardness and gravity tend to separate as they are transported by run-off or soil creep. The harder and more weather-resistant minerals show much more mechanical mobility than do the soft and soluble minerals and include the well-known suite of placer and detrital minerals.

Although much of the early geochemical work was done in areas of *residual* soil with a resulting over-emphasis on the use of the method for such conditions, recent work has indicated the possibility of using it in colluvium and frost-stirred (congeliturbate) soil with marked success.

### FACTORS OF DISPLACEMENT

The displacement of an anomaly through creep or slide is easily understood and readily interpreted in terms of local geologic evidence in most places. The similar displacement of a geochemical anomaly in residual soil that was so thoroughly leached that a substantial volume of material had been removed, was established by Hawkes and Lakin (1949).

In those regions where *residual* soils are lacking as in substantial parts of Alaska and in desert areas of the south-western United States, the problem of the prospector is commonly that of following a detrital dispersion train or fan back to the source. Where either extreme aridity or low temperatures retard chemical weathering, metals that are mobile in humid climates may be carried substantial distances as *detritus*.

Detrital dispersion trains of material that is readily weathered under mild humid conditions may also be formed through the work of glaciers. Geologic and geochemical work in Scandinavia early resulted in the discovery of several ore bodies through the study of dispersion trains and fans of glacially transported mineralized rock. In addition to the mechanical dispersion trains found in glacial drift there are many instances of superimposed halos in glacial debris or other transported material that has been swept over an orebody.

In areas of thin soil of colluvium but with heavy vegetative ground cover, as in some of the Arctic tundra areas, rapid sampling with a sharpened pipe has been tried with great success by geologists of the Alaskan Branch of the Survey. This technique was successful in locating three anti-

mony deposits in south-eastern Alaska last year in an area where there was no outcrop and no indication of the antimony deposits present so close to the surface.

### USE OF GEOBOTANY

It is well known that certain plants may be very useful in showing the presence of geochemical anomalies that are not readily apparent at the surface. Ideally the root systems of trees and other vegetation can be powerful sampling mechanisms that bring certain mobile elements up from the subsoil or bedrock from distances as great as 50 or 75 ft.

The elements concentrated in plant materials are not necessarily the ones that best reflect minor elements of the soil. Zinc is highly enriched in many plants; zinc content of ash from mature birch twigs may reach one per cent, even in soils containing not more than 100 parts per million of zinc. It has been established that the zinc content of most plants is so sensitive to factors unrelated to mineralization that it is of little use by itself in locating geochemical anomalies in the underlying soils and rocks—copper, selenium, sulphur, uranium, and lead, show a much better correlation. Different roots of the tree may supply different segments of the trunk and branches, and it has been found that the metal content may show a wide variation in the twigs and branches gathered from different sides of the tree. It is now standard practice in geobotanical work to sample branches around the tree or bush rather than merely to take samples from one side.

The amount of metal taken up by different species of plants shows such a great range under nearly identical ecological conditions that it is almost essential that a substantial amount of preliminary work be done in any new area before selecting the particular species of plants that are to be sampled.

### EXPLORATION METHOD

If geochemical methods are to be used, they should be simple, rapid, and inexpensive. Low-cost personnel should be able to operate them with relatively little training. A fair degree of precision rather than a highly quantitative accuracy, is the end sought in applied geochemical prospecting. It is always desirable to make preliminary orientation surveys in geochemical investigations so that the geochemical problems and the sampling problems can be evaluated before embarking on a full scale programme. Geochemical surveys may fail needlessly even when the analytical work is satisfactory, if the type of anomaly sought does not exist, or if the samples were taken in the wrong places, in the wrong materials, or with the wrong spacing. Preliminary work should establish the proper procedure to be followed.

The five problems that must be resolved for efficient working are therefore: the elements to be sought, the material best suited for sampling, the most effective analytical procedure, the best geometric pattern for sampling, and the maximum permissible spacing of the samples necessary to reveal anomalies.

The answers to these problems depend on the kind, size, and the homogeneity of the anomaly, and on its general shape, e.g., a dispersion train, a dispersion fan, or a dispersion halo. Since most geochemical anomalies are a result of movement of soil, water, or rock, the direction of movement, the topography, and the size and shape of the source of the material are the factors determining the geometry of the preliminary sample pattern. With linear features, traverses are commonly made along lines crossing the dispersion train at right angles, and the samples are taken closely enough to assure that at least one or two samples will fall within the zone of an anomaly.

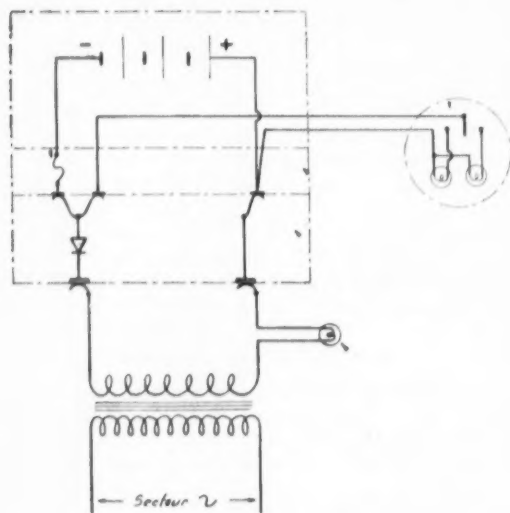
# Mine Lamp of Novel Design

A mine lamp incorporating novel principles of design has been introduced recently by the Société "Elau," Paris. Designated the Elau Type 3, the lamp consists of a projector with a flexible cable and a cadmium-nickel SAFT Voltabloc battery which is claimed to be entirely leak-proof and is described in the following article.

The Elau lamp, type E comprises a projector with flexible cable and a cadmium-nickel SAFT Voltabloc battery, which is claimed to be entirely leak-proof.

The battery has been designed to provide maximum capacity with the minimum of weight and bulk. It is contained in a box only 110 mm. long, 55 mm. wide and 130 mm. high. The projector has very few components and also meets the miner's requirements for maximum light with minimum weight and encumbrance.

The complete lamp weighs only 1.900 gr. It can be used as a miner's lamp, the accumulator being carried on the belt and the projector fixed to the hat. Alternatively,



Electrical Scheme of the Elau lamp.

the accumulator can be supported by a shoulder-strap, the projector being held by a supporting belt at the height of the man's chest. The lamp can also be transformed into a hand-lamp by hooking the projector to a movable handle with which the accumulator is equipped.

## PRINCIPAL FEATURES

Among the principal features of this equipment is the fact that one of the conductors of the projector cable is connected to a socket which accommodates two bulbs, and the other to a contact spring.

According to the position of the operating switch, a circuit is formed with either a central or an auxiliary bulb, the intermediate position being the "off" position. The contacts are made of beryllium-bronze, which combines a high degree of elasticity with excellent conduction, thus ensuring perfect electrical contacts and eliminating drops in voltage.

The reflector is of pure aluminium and has high reflective power. A choice of several types of rectifier is available, each one corresponding in form to a luminous pencil from an aperture of a different size. By judicious selection of the reflector, perfect lighting for any particular type of

work can be obtained. The central bulb is of krypton and gives a very powerful light, although the consumption is in the order of only 0.9 amp. at 3.75 volt.

The projector mirror is made of hardened glass and is therefore shock-proof, though of thin and light construction.

## HERMETICALLY SEALED CELLS

A further feature is that the battery consists of three SAFT Voltabloc cells constructed of cadmium-nickel and having a nominal capacity of 10 amp. These are connected in series and are enclosed in an aluminium case which is highly resistant to shock and wear. The plates are of sintered nickel impregnated with energized material. The separators are made of nylon and each cell is entirely insulated by a sheath of plastic material.

Each group of plates is compressed into such a small space that the distance between individual plates is small enough to permit the immediate recombination of hydrogen and oxygen formed at the surface after charges. Thus no more gas is evolved by the cell, which can be completely sealed off. The fact that the cells are, in effect, hermetically sealed eliminates the periodical filling and cleaning associated with batteries of conventional design.

The two charging points are located above the lid of the battery box, which also supports a rectifier of selenium-iron. This rectifier makes it impossible for discharging to occur due to short-circuiting of the charging points. It is also used for rectifying the current during the charging operations.

The battery is so designed that it can only supply the projector when the lid is in position. This arrangement allows the current to be cut off without difficulty when the projector or cable has to be repaired. The lid is held in position by two special nuts fixed on two bars, one of which is also used for attaching the cable.

## THE MONOBLOC CHARGER

Each lamp has its own charging equipment, which comprises the charging system and the battery support.

The battery is charged by sliding the box, upside down, until contact is made between the charging points and the springs of the charging device. The charging block is extremely simple since no rectifier is required, the latter being incorporated in the battery as previously stated. Regulation of the charge is entirely automatic. A signal lamp shows that the battery is being charged and serves at the same time as the system controller.

Self-contained charging units—that is to say, units possessing their own transformer—can be composed of any number of lamps from one to six. Charging benches having a larger number of lamps are assembled by a judicious arrangement of these units. In a mine the charging bench would normally comprise a hundred lamps, but it is possible to build benches up to several times that size.

The bench is normally supplied with A.C. current at 220 volt 50 cycles, but, if necessary, charging can be effected at less than 120 volt. The power consumed by the lamp is approximately 8 watt.



# Development and Exploitation of the Copper and Tungsten Resources of China

The easing political tension now apparent between the Eastern and Western powers once more raises the question as to whether China can afford to open up its vast and largely untapped resources of mineral wealth. Any assessment of the current position is, of course, hampered to a marked degree by lack of reliable information, and because of this fact the output statistics quoted below must be regarded as estimates only. The article is reproduced from *Mineral Trade Notes*, Vol. 40 No. 3, a monthly bulletin published by the U.S. Bureau of Mines.

Copper deposits are found in many Chinese provinces, and total reserves are believed to be large. The former National Geological Survey of China estimated copper reserves at 963,590 tonnes. The present Minister of Geology states that total reserves are larger than those of Chile.

The best known copper mine is Tungchuan in Huichueh, northern Yunnan, where the ore is said to contain about 5 per cent copper. The mine formerly produced 400 to 500 tons of refined copper annually. The next most important mine is the Pengshien in Szechuen, which has been worked on a small scale for many years. Plans to develop this mine were made in 1936 but were abandoned because of the war, but a temporary smelter with a capacity of 40 tons of crude copper a year was built during World War II. The former National Resources Commission's plans to develop the Yanghsin copper mines in Hupeh in 1936 failed to materialize.

Copper was mined for years by primitive methods at Yungchin and Hweili, in Sikang. These deposits are believed to be large but of low grade, and the development of the area is handicapped by a shortage of fuel from nearby sources and by insufficient transportation facilities. Copper production was small and was suspended at the end of the war.

Other deposits are found at Chiyuan and Sinyang in Honan, Tungling and Chunsien in Anhwei, Tayung in Hunan, Yenfung in Hupeh, and Kanhsien and Hsiujen in Kiangsi. The Tungling mine was worked by the Japanese during the operation. Several copper mines in the north-east, containing low-grade ore are, Tienpaoshan, about 14 kilometers north-west of Laotokou on the Changchun-Tumen railway in Kirin Province, with an estimated reserve of lead, zinc, copper and silver ores amounting to 3 million tons, Shihtsuitsu in Pangshih hsien, Kirin, with an estimate copper reserve of 70,000 tons, Huinan in Liaotung province in the general area of Shihtsuitsu some 25 kilometers south of Pankshi in Kirin, Malukou in the Penchihiu area, Liaotun, Fuyung in Chuangho hsien in Liaotung, Huatung in the neighbourhood of Fuyung, and Chiashan in Liaosi Province.

## REPORTED DEPOSITS

Sinkiang is said to contain rich copper deposits, but these and deposits mentioned are not included in the National Geological Survey of China estimate of reserves. According to the *Peiping Hsin Hua Monthly*, of May, 1950, copper ore of "excellent quality" was found at Paicheng in southern Sinkiang. Urumuchi (Tihwa) was said to contain "rich deposits of good quality," which were once worked but later abandoned. Copper ore also was discovered in the Tarbagatai mountains and in the area west of Ili. A 32- by 30-mile area in Kashgar was said to contain copper ore of good quality. "Red copper and blue copper" were found at Kashgar, Turfan, Kuche, Yicheng, and Khotan.

The most promising discovery is at Paiyinchang in Kaolan, Kansu. The *Economic Weekly*, of April 16, 1953, states that the deposit is at least comparable to Tungchuan in size, and its ore is of good grade. The same paper states

that high-grade "variegated copper ore" has been found in the Niushan area on the southern foot of Chingling mountains. The Hong Kong *Wen Wei Pao*, of April 24, 1954, states that drillings are being made at Ta Pao Shan, about 65 kilometers north of Chengtu, on a site termed as the "first copper prospecting district in Szechuan". Intensive prospecting is going on at these two areas.

Other claims refer to new copper deposits recently found at two places in Hsuehuashan in Pengpu and Yuehsing-shan in Anking, Anhwei Province, as well as at Tayeh in Hunan, where dark blue copper ore and green "peacock stone" were found exposed on the surface of the ground mixed with iron ore. Tayeh and Yangshin in Hunan are known deposits. Copper deposits of "considerable size" were found in the "terrace district" of Chungking, Kweichow, Kunming and Paan in the south-west.

In the north-east eight new copper deposits with a total estimated reserve of several million tons were found in 1950. Later reports said "several hundred" nonferrous metal fields were found by prospecting parties in the hilly regions of Jehol, Kirin, Sungkiang, Liaosi, Liaotung, and Inner Mongolia.

## PRODUCTION ASSESSMENT

Reliable information on the production of copper in China is scarce. Actual production is believed to be less than the press reports. The following output is based on published indices: 1950, 6,325 tons; 1951, 8,325 tons; and 1952, 10,692 tons; 1953, 14,541 tons. These figures are believed to be high and provisional estimates place output of primary and secondary copper at 4,000 tons for 1950; 5,500 tons for 1951; 7,000 tons for 1952; and 10,000 tons for 1953.

Little has been reported about the development of copper mining in spite of current copper scarcity and claims of the discovery of new deposits. Aside from the prospecting and drilling reportedly under way at Tungchuan in Yunnan, Paiyinchang in Kansu, and Niushan in Shensi, little is said about increasing copper production facilities.

Claims noted are as follows: Third quarter 1953 plans for "various construction projects" at Tungchuan were reported completed, although details were not given; a 243-kilometer highway over very rough terrain was completed in March, 1953, connecting Kunming with Tungchuan; the projected construction of the Chengtu-Kunming railway is expected to further improve transportation facilities to and from Tungchuan and Kochiu, and in the north-east it was claimed in 1950 that the production capacity of gold and copper mines in the area had been increased by 189.9 per cent over the 1949 level following State investment in these industries. Improvement has been noted in copper-smelting facilities.

In this connection, the Communist press stated that before "Liberation" electrolytic copper was produced only in Kunming, Chungking, and Mukden but is now produced also in Shanghai, Canton, and possibly Antung. Expansion of the Mukden smelter was completed in September, 1953. This project was listed as one of the 25 key industry pro-

jects planned for 1953. The completion of the smelter was in line with the communist policy initiated on their accession to power in 1949 when they introduced measures designed to ensure the economic use of materials. After the outbreak of the Korean War, the enforcement of the United Nations embargo on shipments of strategic materials, and the launching of the five-year industrialization plan, shortages of some materials became more pronounced and measures for their economy were intensified. An outstanding example is that of copper, the trade and movement of which is now controlled by the government and its use banned for non-essential production.

In October, 1950, the Economic Financial Committee of the Central South Military and Administrative Commission banned the export of copper, including copper coins, alloys and products thereof. On January 12, 1952, it was announced in Shanghai that all agencies wishing to buy manufactured items of copper must be registered with and have the approval of the East China Department of Industry. On June 20, 1952, the Northeast People's Economic Planning Committee announced that copper should not be used for articles of which copper is not an indispensable component. In 1953 these measures were followed by launching of campaigns to collect, through co-operatives, articles made of copper and copper alloys.

By 1954, regulations were promulgated banning the free movement of copper and alloys and articles made of the metal. Under these regulations, shipments of these articles must be covered by a license, and factories using them as raw material must not resell them. It was reported that by substituting other materials in more than 200 items normally made of copper or copper alloys over 4,000 tons of copper a year was saved.

#### TUNGSTEN PRODUCTION

In so far as tungsten is concerned, the former National Geological Survey estimated tungsten ore reserves of Kiangsi (1,647,500 tons), Tunan (51,100 tons), Sinkiang (8,600 tons), and Kwangtung (328,100 tons) at 2,035,300 tonnes. According to *The Economic Weekly*, Shanghai, April 16, 1953 reserves have been unofficially revised to 52,000,000 tons.

In 1951 scheelite deposits were reported in the north-east for the first time. During 1954, rich tungsten deposits were found mixed with other minerals in Kwangtung. *Ta Kung Pao*, Hong Kong, August 13, 1954, stated that Kwangtung now ranks second only to Tachishan and Sihwashan in Kiangsi as the largest tungsten reserve in the world. The Northwest and Suiyuan are reported to contain newly discovered mineral deposits including tungsten, and scheelite deposits are said to exist in Hunan and Kwangsi.

It is believed that output of tungsten has not been as high in recent years as in the pre-World War II period, because of the absence of large-scale development projects, the state-controlled collection of ore, which has served to discourage production by widely scattered but numerous important peasant miner operators, and because of the drop in exports to the non-Soviet areas, which is not compensated for by increased exports to the Soviet bloc.

It has been stated that the output of tungsten in 1950 was 76 per cent of the "historic peak" and in 1951, 80 per cent. Calculated output was 8,052 tons in 1950 and 8,476 tons in 1951. In June, 1950, work was said to have begun on an ore-dressing plant in Kiangsi. The plant was scheduled for completion at the end of 1950, but owing to a reported shortage of labour and building materials, it was postponed until October, 1951. The plant was not expected to begin operations before July, 1952.

It further has been reported that the Kwangtung Provincial Non-Ferrous Minerals Bureau planned to open 10

non-ferrous mines in 1954, including three manually-operated tungsten mines and two semi-mechanized tungsten mines. One manually-operated tungsten mine in the area was to be rehabilitated. Upon completion of these projects, production of tungsten by the provincial government-owned mines in Kwangtung was expected to be increased 425 per cent over 1953. By October, 1954, it was reported that most of the projects had been completed and put into operation. Two new tungsten mines were to be opened in eastern Kwangtung.

#### PROCESSING ACTIVITIES

It was claimed in July, 1951, that the first pure tungsten bar (99 per cent) was successfully produced at the Shanghai Electric Bulb Manufacturing Plant. The former Metallurgical Research Institute succeeded in producing tungsten oxide (99.6 per cent) in 1943. In the following year pure tungsten of 98.947 per cent purity was produced by reduction with carbon, and tungsten of 99.84 per cent purity by reduction with hydrogen.

According to *Wen Wei Pao*, of February 13, 1954, and *Ta Kung Pao*, of January 2, 1955, the Shanghai Electric Bulb Manufacturing Plant added a new section for manufacturing tungsten filament coils in 1954, which began formal production in January, 1955. Tungsten carbide and high-speed cutting tools also were reported being made at the plant. Tungsten wire is reported to have been successfully drawn in August, 1951, and the first bulb with a domestic filament was lighted in September, 1953. Despite these claims domestic demand for tungsten is believed to remain small.

#### THE PRINCIPAL EXPORT

In the past China was the world's leading exporter of tungsten, and this commodity is believed to be the country's principal non-ferrous metal export.

Hong Kong trade statistics show that 4,809 tons of tungsten ore was received from China in 1949, and in 1950 only 47 tons were received. It is doubtful that exports to the Soviet bloc have offset the quantity formerly sent to non-Soviet countries.

## Correspondence

#### SEPARATION OF COLUMBITE BY SIEVING UNIT

The Editor, *The Mining Journal*,

Sir,—In the article by Mr. J. Hurst on "Separation of Columbite by Sieving Unit," the third paragraph reads:

"Although it has long been known that the dumps of refuse material on some tin mining sites contained large quantities of columbite, no means could be found whereby this columbite could be separated from the surrounding material at a profitable rate, in spite of the fabulously high price that could be obtained for the ore. Great interest was therefore evoked recently when a machine was placed upon the market by means of which almost any predetermined metallic ore could be separated."

We think the author should have taken the trouble to get his facts right, inasmuch as the operation is being done magnetically—as is evidenced by the number of "RAPID" Ore Machines which are successfully operating in Nigeria.

Yours faithfully,

T. G. HAWKER, B.Sc., A.M.I.E.E.

July 21, 1955.

Rapid Magnetic Machines Ltd.,  
Lombard Street, Birmingham, 12.



# Increased Base Metal Production in the Philippines

The Philippines possesses rich mineral resources which as yet have not been properly explored or developed, largely owing to its dependency upon foreign demand and lack of indigenous investment capital. The mineral industry ranks fifth in the Philippines economy, however, and in the following article by J. S. Cabarrus, president, Base Metals Association of the Philippines, the general picture of mineral exploitation in the area is described in a tone of sensible optimism. The article is condensed from *The Journal of Commerce*, and is perhaps enhanced by the knowledge that recently uranium was discovered in a Philippine iron ore mine and that comprehensive exploration work is in progress to determine the extent of the deposit.

While base metal mining looms large in the expansion of the Philippine economy, it enjoys a peculiar position in the economic picture because all base metals produced are exported due to the absence of domestic industries to ensure their effective use.

Hence, the expansion of the industry depends completely on the demand in foreign markets, to-day limited to two countries, Japan and the United States. As an export industry, however, base metal mining ranks fifth in value, being surpassed only by copra, sugar, abaca fibre and lumber and logs in the economic structure of the Philippines.

## UNEXPLOITED DEPOSITS

In spite of the increase in value of mineral products and the rising volume of production achieved during past years, informed observers have been prompted to declare that base metal deposits in the islands have barely been scratched and that a base metal mining industry, as an industry is known in well developed countries, has not yet been started in the Philippines.

This observation confirms the reports of American and other foreign geologists and mining engineers who have been engaged in mining operations in the country for many years and of those who had the opportunity to examine the mineral resources of the country. The deposits need proper exploration and development to become of economic use to the Philippines as well as to other countries.

Yet exploration and development of mineral deposits require adequate financing. There are a few mines which have been financed by domestic capital, but those who have the venture capital to finance such a highly speculative enterprise as mining are limited in number and cannot be expected to develop beyond the limits of their financial resources.

Banking institutions in the country, two of them owned by the Philippine government, are not in a position to extend loans in sufficient amount to finance mining operations. The banking system has not yet been developed to reach the provincial areas of the country, and except for one Government bank, two or three banks in Manila maintain branches only in three or four cities in the country. The savings of the people, therefore, are not channelled for productive enterprise. Like in many other undeveloped countries, the Filipino people have not as yet developed the system of corporate investment, to pool their financial resources in economic development.

## POTENTIALS OF COPPER PRODUCTION

Copper ore deposits are known to exist in many parts of the country, from the north in Luzon Island, to Cebu, Negros Occidental, Capiz and Masbate in central Philippines, down to the small island of Tawi-Tawi in the south. Copper deposits have recently been developed, and until comparatively recently only one copper mine was in pro-

duction. But this mine has been known since 1949 as the biggest single producer of copper metal in the Far East. In February this year, the second copper mine, located in Toledo, Cebu Island, went into production with a mill of 4,000 tons daily capacity which is expected to double the present output in the country. The Toledo is the first and largest mining operation of disseminated copper ore in the Far East. Additional equipment has already been ordered to increase the mill capacity to 6,000 tons a day this year and to 10,000 tons later.

There are several deposits now being worked in various parts of the country. Two of these have already laid out plans to install mills, the first is the Sipalay copper mine in Negros Occidental and the other is the Cabapa mine in Zambales, western Luzon. The Sipalay mine is expected to be as big as the Toledo mine, with engineers estimating that some 10,000,000 tons of ore are in sight in an area covered by two claims of the 200 odd claims of the mine.

## SCATTERED DEPOSITS OF CHROME

Chrome ore deposits are widely scattered and found in many provinces of the country, but the most extensive are located in Zambales, on the western coast of Luzon Island. These deposits contain both metallurgical and refractory grades of chrome ore, and one mine alone is known to contain the largest single mass of refractory grade chrome ore in the world.

The Philippines to-day is the primary source of supply of the United States for refractory grade chrome ore, supplying more than 80 per cent of the annual requirements of American industries. It is interesting to note that these shipments come only from one mine in the Philippines.

Last May, the U.S. Commodity Credit Corp. signed a barter arrangement with the biggest Philippine producer of metallurgical grade chrome ores in exchange for U.S. surplus agricultural products.

While the Philippines supplies a small amount of metallurgical chrome ore, approximately five per cent of the U.S. annual requirements a year—it ranks fifth as a source of supply. There is no doubt that shipments could be increased and production expanded if sufficient capital existed to finance the exploration and development of existing deposits on a long-term basis of volume production to reduce costs.

At the present there are only three iron ore mines in production, but extensive deposits have been reported in many parts of the country. The grade of ore is considered acceptable to the requirements of steel mills in the United States, but the long distance in ocean transportation would not allow mines to operate at a profit.

There are no steel mills in the Philippines which can turn the ore in pig iron and finished steel products. All production, therefore, is exported and only to one country, Japan, which is the nearest market where a well developed and integrated steel industry exists.

## REVIEWS

**Year Book of the American Bureau of Metal Statistics.** *Thirty-fourth annual issue for 1954. Published by the American Bureau of Metal Statistics. Pp. 123. Price \$3 post paid.*

The international survey records for 1954 and previous years, production and other economic statistics on a world-wide basis of copper, lead, zinc, aluminium, gold, silver, tin and other metals including nickel and platinum. Tables of metal prices and lists of metallurgical plants and their capacities are also given.

A valuable book of reference.

**Quin's Metal Handbook, 1954.** *Edited by K. V. Henderson, B.Sc.(Econ.)F.S.S. Published by Metal Information Bureau, Ltd. Pp. 736.*

With its 1953 edition *Quin's Metal Handbook* reached what was considered the maximum size for a convenient desk reference book, and for this reason emphasis in the current issue has been placed on the improvement of existing tables and features rather than on the introduction of new departures. Nevertheless, with the increased volume of statistics now available some expansion is stated to have been inevitable and to accommodate this entirely new material, certain standard features have been omitted from the 1954 edition.

New features included, however, are the Approximate Analyses of Representative Brands of Lead and Zinc, daily prices on the London Metal Exchange, and the estimates of the production and consumption of the main base metals for the current year, commenced in the last issue, has been repeated.

This publication falls into the "must" category.

**Colliery Year Book and Coal Trades Directory, 1955.** *33rd Edition. Published by The Louis Cassier Co., Ltd. Pp. 980. Price 30s. net. By post 31s. 4d.*

This 33rd edition of the *Colliery Year Book* presents in a convenient and reliable form the fullest information on the coalmining and allied industries. The data in the standard sections has again been thoroughly revised and the appointments recently effected in the National Coal Board are included.

New features have been introduced in this edition. These include details of the principal coal mines in the United States and this, together with particulars of the coal mines in Western Europe, introduced in 1953 and now revised, illustrates the growing readiness for co-operation by all those engaged in the industry in other lands. Another item of interest is the Coal Industry Films Guide, while considerable space has been given to the Mines and Quarries Act, 1954. For easier reference the Mines Index and the Statistical sections are separately coloured on the fore-edge of the book.

In a foreword, Mr. W. E. Jones, President of the National Union of Mineworkers, stresses the increasing responsibility of the coal industry in relation to Britain's industrial effort. Mention is made of the readily assimilated information contained in the *Colliery Year Book* as a means of providing an extremely useful service and a valuable part of the organization in coal mining.

**Royal School of Mines Journal, No. 4, 1955.** *Pp. 68. Illustrated and with additional advertisements.*

Maintaining the tradition of its predecessors, this edition of the *Royal School of Mines Journal* combines the presentation of technical papers with an interest in the student that produces a pleasing publication.

Among the technicalities discussed are *The Analytical Chemistry of Chromium, Mining and Smelting Conditions in Malaya and Some Considerations Governing the Mining of Oil*. Other articles present interesting information on lead-zinc occurrences in East Greenland as well as news briefs on current school activities. An interesting publication, well produced and illustrated.

## TECHNICAL BRIEFS

### Resisting Corrosion in Mines

The problem of corrosion in mines traditionally is one of considerable magnitude. In the constant fight against corrosion Serviron Dampcoat, a permanently plastic anti-corrosive coating manufactured in England by Xzit (G.B.), Ltd., has for some years been employed in coal mines in Great Britain. It is claimed that the material can also be used in metalliferous mines. In addition to its properties as an anti-corrosive coating, Serviron Dampcoat also acts as a lubricant. Its main qualities are the ability to be applied equally well to a damp or sweating surface as to a dry surface; the property of remaining semi-plastic and adhering to the underlying surface; waterproof and moisture repellent qualities and properties as lubricant.

### A New Aluminium Alloy

Revere Copper and Brass Inc., one of the largest fabricators of copper bar for electrical uses, in the United States, has developed a new high-strength aluminium alloy for the electrical industry. The company reports that the new magnesium silicide alloy was the result of joint research with the Aluminium Company of Canada.

Designated as Revere Alloy 6263, the new product is said to develop mechanical properties approaching those of copper, and to have electrical conductivity approaching that of the conventional EC aluminium alloy, which has found considerable use as a conductor material in the form of wire and rolled and extruded bar.

### Interesting Metals Techniques

Northern Aluminium Co., Ltd., has recently reprinted in book form a series of articles on the excellent forming characteristics of aluminium and the methods of taking full advantage of them, originally written as a series of articles by H. Hinxman, a development engineer of the company.

The book is entitled *The Forming of Aluminium Sheet*, and presents in readily applicable, essentially practical form the fundamental concepts of the usage of the material. The subjects dealt with in its pages include the characteristics of the metal, and its manipulation in bending, spinning, deep drawing, pressing, drop-hammer forming, rubber-die pressing, stretch-forming, hand forming, blanking, piercing and various supplementary operations. All are illustrated by examples from actual practice, which are described in detail.

An interesting handbook of hard metals is a British translation of the major part of the *Handbuch der Hartmetalle*, published early in July by H.M.S.O. Three firms shared the task of translation, namely Hard Metal Tools, Ltd., Metropolitan Vickers Electrical Co., Ltd., and Murex, Ltd. The author, Dr. W. Dawidl, now a Reader in Metallurgy, at the Illingen University, Saar, is a leading authority on sintered metal techniques.

The handbook deals with three principal classes of hard metals, viz., sintered alloys of hard carbides to which small amounts of metals have been added, alloys with a tungsten carbide base and hard facing alloys applied by gas or electrical welding to a hard carbide base. The publication opens with a general survey of the subject and of the physical properties of hard metals and metallography. It goes on to deal fully with the scientific principles of the sintering technique as far as they apply to the production of hard metal.

A comprehensive and informative description of the innumerable ways in which the appearance and performance characteristics of aluminium can be changed is presented in a new four-colour book published by Aluminium Company of America. *Finishes for Alcoa Aluminum* demonstrates the versatility of aluminium in presenting the myriad of colours and appearances which make aluminium the metal with a thousand faces. The book opens with descriptions of the basic characteristics of aluminium finishes.

## METALS, MINERALS AND ALLOYS

**COPPER.**—The strike in the American industry came to an end last week with the announcement of a settlement between the Mine Mill Union and Kennecott Copper. The package agreed on was worth 15½ c. and included a straight rise of 10 c. an hour. Work restarted on Wednesday the 17th. The amount of copper lost since the strikes broke out about six weeks ago is put at not far short of 80,000 tons and it is impossible yet to assess the damage. In the first place—as forecast last week—Anaconda raised its selling price of copper on Wednesday to 40 c. per lb. with Phelps Dodge following on Thursday and Kennecott expected to follow immediately. With the free world price well in excess of that level this may be thought to be a relatively unimportant adjustment. But it has been the role of the American price in the last 18 months to represent the floor and it is a sobering thought that the floor may now be as high as 40 c. or its equivalent. It is worth recalling that, when copper was first dealt in in London in 1953 there were many who thought that copper would quickly go below £200 and the metal was heared in that expectation; in the last month or two copper has got dangerously near to £400 in London and another strike this year by a major producing country could easily send it there. The American producers are, naturally, worried about the competition from aluminium and plastics, and the best evidence of that is the rush among the copper interests to move into aluminium production. It is extremely difficult, however, to assess the danger from aluminium since for few uses can consumers switch easily from one metal to another in response to market fluctuations of the raw materials. For most purposes a user must calculate a price at which it is worthwhile making the change and support his decision by a long term assessment of price trends. Hence the importance of the floor price. An American price of 40 c. serves notice that, in the foreseeable future, American copper is unlikely to go below the previous level of 36 c.; and that, for some who are uncertain about whether to make the change, may be all they want to know.

There is, of course, no doubt that copper will stay acutely short for the rest of the year. Production of American copper in July was only 39,421 tons against 101,940 in June and production of refined copper was only 51,182 tons against 130,881 tons. Demand for instant usage will absorb almost all current production and the filling of pipelines and the stocking of inventories will easily absorb the rest probably till the end of the year in spite of the remarkable resilience of the big American opencast pits. Now that copper stands at 40 c. the pressure to stock up by December 31 among firms taxed on last-in-first-out principles will be very strong indeed.

Only if the president releases copper from the stockpile can there be any immediate release from the almost intolerable pressure on nearby supplies. *American Metal Market* has carried a vigorous leader claiming that the circumstances are sufficiently extraordinary to justify a release for commercial usage and not merely for defence contracts. It uses a rather poor argument that the industry has been jeopardised by a communist union. But it was the existing copper tightness rather than the politics of the Mine Mill Union that was the cause of the trouble. Yet if, as it elsewhere reports, the American Government would not consider releasing stockpile copper except in war, it can certainly claim that the Administration is being seriously inconsistent. If it is not prepared to release copper to relieve a commercial shortage it should never have taken Chile's 100,000 tons to relieve a commercial surplus. Governments are best out of business but if they have to meddle they should meddle consistently so that everybody knows how things stand. If it is true that stockpile copper is never going to be released except in time of war it would be helpful to have an unequivocal statement to that effect; it would also help to have a closer definition of the conditions for acquiring stockpile—i.e. untouchable—copper.

Meanwhile, not unexpectedly, Chile is taking advantage of the present tight supply to press for the most profitable marketing of her metal. The Copper Department has announced an agreement with Anaconda and Kennecott to sell from next year about 66 per cent of their output in Europe; of the remainder, there would be an allocation for domestic consumption and the rest would go to the United States. This agreement puts an end to a good deal of ill-informed comment. The copper now being delivered is not affected because it was sold by the Central Bank when it was in sole charge of copper sales and it is probable that it will take most of this year to work off these contracts. This copper was sold at fixed prices, guaranteed prices, prices ruling or combinations thereof, and for some

of it, at least, the Copper Department is pressing for a better price. It could presumably only get this, in the last resort, for copper sold at a fixed price by defaulting on a contract. What is interesting about the news, however, is the light it throws on the Copper Department's ability to influence selling policy now that the copper companies, under the new copper law, are free to sell their own copper. It will be recalled that disagreement on the precise strength of this influence was the cause of the long delay in passing the copper law. The copper companies, of course, will benefit to some extent. Under the old system they sold their copper at a fixed price to the Bank and were not advantaged by high ultimate selling prices. Now they will make bigger profits (though pay bigger taxes) from selling in Europe which will offset to some extent the loss of Chilean copper at a cheap price (judged by L.M.E. standards) by their American associates. This is the first time that the Copper Department has shown its hand and it is an important matter to watch.

The Copper Department has also announced that an offer has been received from London for 150,000 tons guaranteeing a price of 36 c. but with a maximum of 40 c. It is difficult to confirm this sort of thing but it should be remembered that such offers (if they exist) would be for copper deliverable next Spring or thereabouts. It also appears that a strike has been averted at El Teniente by the granting of a wage increase but it is not clear whether the increase is being made dependent on the companies receiving an exchange rate of 300 pesos for their operating expenses. It is said that the companies are insisting on this rate before raising their price to the United States. On the other hand, the Union has said that it will expect a cut of any such "windfall" to the companies and will strike to get it. The Chilean outlook is depressing.

From the Copperbelt it is reported that the European underground mine workers who struck on August 11 at Mutlira against an alleged infringement of job categories returned to work on August 13. It is understood that the dispute is not settled but that negotiations are taking place. R.S.T. has sent a letter to the European Union explaining that though it regards the agreement with the Anglo American group as a move in the right direction it objects to the Union's demand for a power of veto, to the number of jobs transferred which it considers too small, and to the time limit for the jobs survey. Until the matter of African advancement is settled, at least temporarily, one cannot feel happy about the continuity of Rhodesian copper supplies and the persistence of disagreement on this fundamental issue must tend to exacerbate feelings on side issues.

Magundi Copper Mines has issued a statement that by agreement with North Charterland Exploration Company (1937) the North Charterland Mineral Concession area in Northern Rhodesia will for a time be explored by Magundi. 10,000 sq. miles are involved.

The Boliden Mining Company of Sweden is reported to be prospecting copper in Angola and Mozambique under a mining concession granted by the Portuguese Government.

**LEAD AND ZINC.**—Both lead and zinc have been in strong demand in the United States and there is continuing talk that the price of both metals is likely to rise. There are, however, factors operating against a rise. In the case of zinc, the rise in July smelter stocks (reported last week) has commanded respect although it is readily explained by the summer vacations. In the case of lead the strike at American Smelting and Refining plants has ended and work has started on refining the piled up stocks of ores and concentrates. There is no gainsaying, however, the strength of commercial demand or of the American economy in general and these must be only temporary setbacks. Production of American mined lead in the first half of this year was 170,000 tons against 160,700 in the first half of 1954.

**TIN.**—Tin has been a fairly quiet market in New York with the price holding fairly steady with slight fluctuation around 96½ c. per lb. for spot Straits metal and operators watching London and Singapore for a lead. At the end of the week some strength was derived from the rise in copper. Demand has been quietly good and the demand for tinplate in the third quarter is expected to show a smaller than normal seasonal decline but buying is being put off where possible until a discernible trend appears. There is little doubt that the trend ought to be downward for the price worked up largely on the tightening of credit (an influence which is now exhausting itself) and on the possibility of the disruption of Eastern supplies (which has for the time being disappeared). Yet the situation in the East is far from satisfactory. Another strike of



city employees has broken out in Singapore and obviously a good deal hangs on the happy outcome of the Colonial Secretary's current discussions on the prospect of self-government in Malaya and Singapore. In so far as fear of labour troubles has contributed to the rise in tin a fall may be justified but not, on this count alone, a big one. Mr. Waring, chairman of Anglo-Oriental Mining Group, has called for a rapid conclusion of the I.T.A. because the previous world surplus will not continue to be absorbed indefinitely and forecast a serious drop in price if ratification were not concluded. Present American contracts are satisfactory but, as was pointed out here last week, are all short term.

Meanwhile, in Indonesia the situation has changed sharply and the Socialists and moderates who have been in opposition have now managed to get themselves into power. On the long term this is an excellent thing for it is the only hope of shaking off the tightening Communist grip on Indonesia. What is by no means yet clear is what effect the change will have on the prospect of an early ratification of the I.T.A. The Government is now carrying out a campaign against corruption in the Administration and has also to prepare for the forthcoming elections. Furthermore, with the Communists now officially in opposition they may attempt to stir up labour trouble more forcefully and openly. There is no reason to suppose that the present Government is more unfavourable to the I.T.A. than its predecessor but it may have too much on its hands, regrettably, to spare legislative time for early ratification. Chilean stockholders of the nationalized Oruro (Bolivia) Mineral Company have asked the President of Chile to intervene on their behalf to get compensation. It is an ingenious but scarcely a promising move.

Once again news comes from the States of a new tinless solder. The Dewey and Almy Chemical Company describes it as a thermo plastic organic material which has been developed from similar cements announced by this company several years ago. It is claimed that under weighting tests it averages 15 lb. stronger than tin-lead solders.

During the year to June 30 last, Geomines reports a production of 3,804 tons of tin concentrates (against 3,861 tons in the previous year) together with 2,225 tantalite (against 171 tons) in 1954.

**ASBESTOS.**—According to the Philadelphia organ, *Asbestos*, the demand for asbestos fibre is running near peak level. Unlike similar periods in the past supplies are such that no curtailment of manufacturing schedules is necessary.

**CHROME.**—Shipments of chrome ore from the Philippines during the first six months of 1955 totalled 217,597 tons which compares with 220,023 tons in the comparable period of 1954.

**NICKEL.**—Eastern Smelting and Refining hopes to have its \$20,000,000 nickel-copper smelter and refinery in operation by July, 1957. The plant is expected to have an annual production capacity of 6,250 tons of metallic nickel and 15,000 tons of blister copper plus cobalt and platinum group metals and sulphur.

**SELENIUM.**—Demand for selenium, the chief market outlet for which is in the manufacture of electric rectifiers, continues to outstrip available supplies. Accordingly, the U.K. price is expected to be increased shortly from its present level of 43s. per lb. delivered for 99.5 per cent metal in 100 lb. lots. This view is strengthened by the recent rise in the U.S. price from \$7 to \$10 per lb. and by the much higher prices quoted on the continent where the price for the metal ranges between 100s. to 140s. per lb.

**ZIRCONIUM.**—Although the U.K. and France produce zirconium, the United States is the only country which has been able to produce the metal on a commercial scale. It is envisaged that U.S. production, which last year totalled 5,000 tons, will reach 30,000 tons this year. Zirconium is one of the most important metals used in atomic reactors.

## The London Metal Market

(From Our Metal Exchange Correspondent)

This week has seen the settlement of the outstanding strikes in the American copper industry and also a return to work at Mufulira after a two-day walkout, but in spite of this and of only a small reduction in the stocks in U.K. warehouses, the undertone of the market has been firm and demand for nearby copper has been sufficiently persistent to cause a sharp increase in the backwardation.

Opinions vary as to the effect on the price level which will result from the resumption of work in America, some thinking that the scarcity of copper is so great that prices paid for marginal tonnages will remain at a level to draw copper from the rest of the world to America, others that as soon as consumers start receiving metal at the producer's price they will be unwilling to pay such high premiums for their marginal requirements as they have been doing in the last few weeks. If the former view is correct, the London market should remain around its present level for cash and nearby metal, with a tendency for the backwardation to increase as the three months' outlook becomes easier; if the latter is correct, the London cash price may be maintained for a short period whilst shipment is made against existing contracts with American buyers, but when these have been completed the general price level should fall substantially.

The tin price has developed firmness on news of further unrest in Singapore, but no major upward move is expected unless shipments are seriously affected for any length of time. On Thursday morning the Eastern price was equivalent to £763½ per ton c.i.f. Europe.

Lead and zinc remain in good demand with prices slightly under the best reached a fortnight or so ago.

Closing prices and turnovers are given in the following table:

	August 11		August 18	
	Buyers	Sellers	Buyers	Sellers
<b>Copper</b>				
Cash .....	£357½	£358½	£374	£376
Three months .....	£351	£352	£361	£362
Settlement .....	£358½		£376	
Week's turnover .....	3,450 tons		3,300 tons	
<b>Tin</b>				
Cash .....	£747½	£748½	£751	£752
Three months .....	£742½	£743	£748	£749
Settlement .....	£748½		£752	
Week's turnover .....	605 tons		430 tons	
<b>Lead</b>				
Current half month .....	£104½	£105	£106½	£106½
Three months .....	£104½	£104½	£105½	£106
Week's turnover .....	2,975 tons		2,075 tons	
<b>Zinc</b>				
Current half month .....	£88½	£89	£89	£89½
Three months .....	£88½	£89	£89	£89½
Week's turnover .....	4,950 tons		3,725 tons	

## OTHER LONDON PRICES — AUGUST 18

### METALS

Aluminium, 99.5%, £171 per ton	Nickel, 99.5% (home trade) £519 per ton
Antimony—	Osmium, £24/27 oz. nom.
English (99%) delivered, 10 cwt. and over £210 per ton	Palladium, £70s./£710s. oz.
Crude (70%) £200 per ton	Platinum U.K. and Empire
Ore (60% basis) 23s. 6d./24s. 6d. nom. per unit, c.i.f.	Refined £29 oz. Imported
Bismuth (min. 1 ton lots) 16s. lb.	Rhodium, £40
Cadmium 11s. 6d.	Ruthenium, £17 oz.
Chromium, 6s. 11d./7s. 4d. lb.	Quicksilver, £94/£95
Cobalt, 21s. lb.	ex-warehouse
Gold, 251s. 5½d.	Selenium, 43s. nom.
Iridium, £30 oz. nom.	per lb.
Manganese Metal (96%-98%) £269 according to quantity	Silver, 79½d. f.o.z. spot and 79d. f'd
Magnesium, 2s. 4d. lb.	Tellurium, 15s./16s. lb.

### ORES, ALLOYS, ETC.

Bismuth .. .. .	20% 3s. 3d. lb. c.i.f.
Chromium .. .. .	65% 8s. 6d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semi-friable) 48%	£13 per ton c.i.f.
Refractory 45%	£13 per ton c.i.f.
Smalls 42%	£10 2s. 6d. per ton c.i.f.
Magnesite, ground calcined ..	£26-£27 d/d
Magnesite, Raw ..	£10-£11 d/d
Molybdenite (85% basis) ..	105s. 0d.-108s. 0d. per unit c.i.f.
Wolfram and Scheelite (65%) ..	255s./258s. c.i.f.
Tungsten Metal Powder ..	20s. 6d. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten (80%-85%) ..	17s. 6d. nom. per lb. (home)
Carbide, 4-cwt. lots ..	£37 6s. 3d. d/d per ton
Ferro-manganese, home ..	£53 17s. 6d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) basis 100s. freight ..	81d./84d. per unit
Manganese Ore (38%-40%) ..	66d./68d. per unit
Brass Wire ..	3s. 4½d. per lb. basis
Brass Tubes, solid drawn ..	2s. 9½d. per lb. basis

## THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The past week was rather an uninteresting one. A rally in equities was not held and prices tended to drift lower as business waned. The pound abroad began weaker but later steadied. This time of year is traditional for sales of sterling to finance overseas purchases and tourists expenditure, so it would be unreasonable to expect an immediate or startling improvement. Fears that the Chancellor might be forced into even harsher monetary policies by wage claims and strikes caused widespread uneasiness.

There was more interest in gold mining shares than for a long time past. Kafir prices recently reached their lowest levels for a long time and buyers came in, encouraged by the higher price of gold brought about by the fall in sterling.

Most of the leading finance houses recorded satisfactory advances, among the most noteworthy being West Rand Investment Trust and Johannesburg Consolidated. The latter company went ahead due to its association with Randfontein and Freddie's in a new area rumoured to have considerable possibilities. This is situated south-east of Randfontein and Venterspost.

Among individual mines, there was some continental support for the older producers and Crown Mines, Durban Deep and Robinson Deep all benefited from this factor. Dominion Reefs went ahead sharply following the report that the company is due to start underground uranium production and in anticipation of improving returns. Hartebeestfontein held last week's gains although there was no further overall advance. Rumours emanating from Johannesburg suggest that an initial dividend may not be long delayed. Randfontein also advanced sharply following the Johannesburg rumours about the new area.

In the Orange Free State market, many of the leading issues rose in sympathy with the general trend. Freddie's, as was to be expected, were an outstanding feature, and Western Holdings attracted strong continental support. The very disappointing underground development results from Loraine, which proved wrong the initial drilling estimate of reef values, caused a

sharp setback in the shares. Under present circumstances, it is difficult to see how the mine can become a satisfactory paying proposition. At one time the shares were as low as 5s. 7½d.

In the West African and the West Australian fields, there was little of interest to report and the better returns from Ariston and Bremang failed to rouse a sluggish market.

Among miscellaneous gold shares, trading was also quiet although there was rather more interest in Rhodesian producers. This led to an improvement in Goldfields Rhodesian Development and Motapa hardened after the better monthly figures.

Among diamond issues the leaders, De Beers and Anglo American Investment Trust, both rose, partly in sympathy with the Kafir market. There was also further interest in Consolidated African Selection Trust in view of the possible developments in Sierra Leone mentioned last week.

Coppers were generally better in sympathy with the improvements in Sierra Leone mentioned last week.

Rhodesian Selection Trust and Roan Antelope were particularly favoured.

Eastern tin shares were erratic, the downward tendency in some shares being counterbalanced by the anticipation of better results from certain individual companies. In the Nigerian market, the recent report of the Bisichi chairman on the columbite outlook was still a major factor. Bisichi shares fell away but there was a slight revival in American Tin and Jantar. Buyers came in for Beralts which rose sharply in a volatile market.

In the lead/zinc section, the price of Barriers was uneven, and shares changed little in quiet trading conditions.

In the miscellaneous base metal market, there was also little of interest to report. Associated Manganese recovered last week's loss and there was some speculative buying of Consolidated Murchison. Turner and Newall followed the downward trend in British industrial shares.

Finance	Price Aug. 17	+ or - on week	Rand Gold contd.	Price Aug. 17	+ or - on week	Diamonds and Platinum	Price Aug. 17	+ or - on week	Tin (Nigerian and Miscellaneous) contd.	Price Aug. 17	+ or - on week
African & European ..	3½		W. Rand Consolidated	45/-	+1/3	Anglo American Inv. ..	9½	+½	Gold & Base Metal ..	2/-	-1½
Anglo American Corp.	9½	+½	Western Reefs .....	40/-	+1/9	Castles .....	29/9	+1/3	Jantar Nigeria .....	7/-	+1½
Anglo-French .....	22/6	-6d	O.F.S. Gold			Cons. Diam. of S.W.A.	7		Jos Tin Area .....	14/9	
Anglo Transvaal Consol.	26/3		Freddie's .....	9/4½	+1/6	De Beers Deft. Bearer ..	6½	+½	Kaduna Prospectors ..	2/1½	
Central Mining (El Shra.)	48/3	+1/6	Freddie's Consolidated ..	5/1½	-1½d	De Beers Pfd. Bearer ..	16½	-½	Kaduna Syndicate .....	2/10½	
Consolidated Goldfields	62/-		F.S. Geduld .....	4½	+½	Pots Platinum .....	9/10½	+3d	London Tin .....	9/4½	+6d
Consol. Mines Selection	42/6	+1/3	Geoffries .....	16/3	+9d	Waterval .....	16/6	+6d	United Tin .....	2/3	+3d
East Rand Consols .....	2/-		Harmony .....	32/6	+6d						
General Mining .....	4½		Loraine .....	6/4½	-3/1½						
H.E. Prop. .....	8/10½	+1½d	Lydenburg Estates .....	18/1½		Copper			Silver, Lead, Zinc		
Johnnies .....	44/4½	+2/4½	Merriespruit .....	9/3	-3d	Bancroft .....	41/6	+6d	Broken Hill South .....	55/6	+6d
Rand Mines .....	3½		Middle Wits .....	15/-	-3d	Chartered .....	72/6	-3d	Burma Mines .....	2/6	-3d
Rand Selection .....	32/9	+1/3	Ofits .....	68/-	+2/-	Esperanza .....	4/-	-1½d	Consol. Zinc .....	53/10½	+1½d
Union Corporation .....	49/-	+6d	President Brand .....	71/10½		Messina .....	9/4½	+½	Lake George .....	12/4½	-1½d
Vereeniging Estates .....	4½	+2/6	President Steyn .....	38/6	+1/3	Nchanga .....	15½	+½	Mount Isa .....	59/6	+6d
Wits .....	44/4½	+1/6	St. Helena .....	31/3	+9d	Rhod. Anglo-American	5½	+½	New Broken Hill .....	40/10½	-4½d
West Wits .....	39/6		Virginia Ord. .....	13/-	-3d	Rhod. Katanga .....	21/4½	-1/1½	North Broken Hill .....	76/3	
			Welkom .....	20/3	+9d	Rhodesian Selection .....	46/3	+1/9	Rhodesian Broken Hill ..	13/6	+1½d
			Western Holdings .....	4½	+½	Rhokana .....	44½	+1½	San Francisco Mines ..	23/-	-3d
						Rio Tinto .....	3½	+½	Uruwira .....	7/1½	-1½d
						Roan Antelope .....	28/4½	+1/3			
						Selection Trust .....	4½	+½			
						Tanks .....	9	+½			
						Thariss Sulphur Br. ..	6½				
									Miscellaneous		
									Base Metals and Coal		
									Amal. Collieries of S.A.	50/3	+3d
									Associated Manganese ..	34/6	+2/-
									Cape Asbestos .....	10/4½	-4½d
									C.P. Manganese .....	36/6	
									Consol. Murchison .....	53/1½	+2/6
									Natal Navigation .....	2½	+½
									Turner & Newall .....	107/6	-1/3
									Wankie .....	17/10½	+1½d
									Withbank Colliery .....	4	-6
									Canadian Mines		
									Dome .....	529	
									Hollinger .....	543	
									Hudson Bay Mining .....	\$125	+3½
									International Nickel ..	\$14½	+½
									Mining Corp. of Canada ..	£8½	+8
									Noranda .....	\$107	+3
									Quebec .....	£94	+½
									Yukon .....	4/3	-1½
									Oil		
									British Petroleum .....	5½	-½
									Apex .....	34/-	-3d
									Attok .....	42/-	-1/-
									Burmah .....	64/3	-½
									Canadian Eagle .....	22/6	-9d
									Shell .....	64½	-8
									Trinidad Leasehold .....	40/-	-2/3
									T.P.D. .....	24/6	
									Ultramar .....	29/3	-1/-



## COMPANY NEWS AND VIEWS

### Saaiplaas Plans to Mill 125,000 Tons Monthly

It was, of course, obvious that the premium at which the maiden issue of Free State Saaiplaas Gold Mining Company 10s. shares have recently changed hands discounted a good deal more in the way of ultimate productivity than the initial monthly rate of 50,000 tons which the property hopes to reach within some six years. And, although a target rate of around 100,000 tons monthly was no doubt envisaged by most investors, the figure of 125,000 tons disclosed in the full prospectus for the offer of 11,000,000 shares of 10s. at par comes as a pleasant surprise. If all goes well with opening-up operations and subsequent development, a good deal of scope for capital appreciation should be possible through a purchase of the company's shares at their present price of about 16s.

The risk—as in any new mine—should not be underestimated and the future will undoubtedly not be without its disappointments and delays. But, so far, underground conditions in the south-east O.F.S. have given rise to substantial optimism. Indeed, so far as is known at present water does not threaten much difficulty, while khaki shale—so great a menace at Freddie's Consolidated to the north-west—although present over about 60 per cent of the Saaiplaas property, exists only as a single band varying in thickness from a few inches to a maximum of 40 inches. Its presence would not therefore appear to constitute a serious mining problem.

On the other hand, the mine has had to start its life with the somewhat heavy issued capital of £5,500,000. But when it is realized that in order to reach production at a rate of 50,000 tons monthly a total of nearly £12,000,000 will be required, the advantage that the possession of sufficient funds for initial shaft sinking from the outset will provide can easily be appreciated. Moreover, as these initial expenses have been estimated in the region of £5,000,000, it seems likely that there may be some balance available towards financing the subsequent underground development programme.

Be that as it may, the problem of providing the balance of finance needed to reach initial production must inexorably arise in the near future. How this operation might be undertaken will naturally depend upon the future course of Kaffir markets. But it can be expected with some certainty that a part of the funds to be raised will be by a further share issue. Such a probability should not give rise to any great fears regarding the ultimate capitalization of the company, for at that time the existence of a substantial premium should make the task easily manageable.

In view of the extremely high cost of bringing a mine to production, the question of gold content is all-important. In this sphere Saaiplaas would appear to be well placed. There are grounds for believing that rich ore will be exposed; boreholes in the initial drilling programme yielded values up to 2,154 in.-dwt. But as the majority of these holes gave very much lower results, the contention held by many people that an exceptionally rich—but narrow—area extends roughly from east to west across the southern part of the mine may prove to be true.

The possibility that Saaiplaas gold deposits will take this form will most likely lead to much speculation in the company's shares up to the commencement of development and during its progress. But for those who are prepared to take the risk that underground sampling will yield—as in many cases in the O.F.S. and Far West Rand—very much higher values than those disclosed by the original drilling programme, Saaiplaas 10s. shares provide as good an opportunity as any for medium-term speculation. It should also be borne in mind that the chances of the property becoming a uranium producer are regarded as favourable.

### Freddie's Far West Rand Project

The report and accounts of Free State Development and Investment Corporation for the year ended March 31, 1955, provides little to endorse the recent rise of the company's 5s. ordinary shares to their present level of around 9s. 6d. which compares with a low point of 3s. 9d. earlier this year.

While there are various possible explanations for this advance it is generally thought that the most likely reason is contained in the short statement which appears in the director's report. This discloses that since the close of the past financial year arrangements have been entered into in terms of which Freddie's will bear 20 per cent of the expenses of a prospect which is being conducted on the Far West Rand by the Johannesburg Consolidated Investment Company. This contribution would bring, in turn, an entitlement to 20 per cent of the net rights which may flow from the undertaking.

This disclosure is extremely vague and some qualification ought to be forthcoming when Mr. K. Richardson, the chairman, makes his statement to shareholders at the meeting to be held in Johannesburg on September 6. Meanwhile, it would certainly appear that the area referred to is that ground which is being jointly explored by Randfontein and the Johannesburg Consolidated Investment Company lying to the east of Venterspost in the region of Zuurbekom.

No prospecting or drilling operations were again undertaken by the company during the past year but net profits earned rose to £44,947 from the previous loss of £6,566, mainly due to profits from sales of shares. Unappropriated profit carried forward accordingly moved up to £122,145 from £77,198. Quoted investments—including the holding in Freddie's Consolidated Mines which represents Freddie's major investment—were shown at a balance sheet figure of £1,149,801 but had a market value as at March 31 of £545,867.

### Over Valuation of Loraine's Reef

The news that a reef over-valuation had taken place at Loraine Gold Mines in the northern O.F.S. came as a shock to the market and the company's 10s. shares have since suffered a fall from around 9s. to their present level of about 6s. 9d.

The statement which disclosed this news emphasized that recovery of gold since operations started had been below expectations and that an enquiry had consequently been made into the possible reasons for the discrepancy. Attention was particularly directed towards metallurgical operations; loss of gold in mining operations and sampling.

It was subsequently established that the last of these three possibilities had been at fault and the trouble had been due principally to reef over-valuation in sampling. This was caused by the presence immediately above the reef of an exceptionally hard mineralized quartzite band which had rendered conventional sampling methods unsuitable. This occurrence has not been encountered at any of Anglo American's mines in the Welkom area.

Every effort has been made to re-assess the previously reported sampling results and the results so far show a decrease in the value of payable footage and percentage payability. Due to stopping operations, however, no direct comparison is possible with the figures previously published. A re-estimate of ore reserves as at July 31, 1955, based on a pay limit of 3.4 dwt. has revealed 501,000 tons over a slope width of 40 in. with a value of 4 dwt. per ton equivalent to 160 in.-dwt.

### Western Selection and Development Group June Quarterlies

The central feature of June quarterly reports of the Western Selection and Development Group was undoubtedly the recovery in Bremang Gold Dredging Company's profits to £42,161 from the low level of £4,924 during the preceding quarter. It would, however, be a gross over-simplification of the position to accept this comparison as it stands without deeper consideration. Serious difficulties were encountered by Bremang during the March quarter and two of its dredges were shut down for several days. In addition to this a working loss was made by No. 1 dredge during the initial production period which followed its reconstruction. During the past quarter all four dredges operated and the only adverse factor appears to have been that No. 2 dredge lost some yardage owing to electrical breakdowns during storms. It was reported that No. 1 dredge is proceeding satisfactorily, recovery being up to expectations. A particularly favourable aspect of the past quarter's operations concerned No. 3 dredge at which recovery was the highest on record.

Company	Sept. qtr. 1954	Dec. qtr. 1954	Mar. qtr. 1955	June qtr. 1955
Amalgamated Banket	102,980	146,236	120,979	82,202
Ariston Gold Mines	178,471	153,046	137,381	143,410
Bremang Gold	36,367	20,350	4,924	42,161
Gold Coast Main Reef	60,383	49,871	32,391	25,026

At Ariston Gold Mines (1929) two distinct reef zones have been disclosed in the area south of No. 2 winze on 24, 25, and 26 levels. The results obtained indicate that the ore shoot increases in value in depth and lengthens towards the south.

In explanation of the fall in profits and production during the past quarter at Gold Coast Main Reef, it is stated that the poor zone encountered in Bondaye main shaft section between the 16th and 18th levels was responsible. The main shaft, it is reported, is being sunk with all speed to the 20th level by-passing the 19th

level. It is expected that development on the 20th level will be well under way by October.

The decline in profits earned by Amalgamated Banket Areas continued from the high point reached in the December quarter of £146,236 to £82,202 during the past quarter. Responsible, to some extent, for this was no doubt the 14,169 less tonnage dealt with at the Pepe opencast section. This was due to the hardness of overburden and reef. With a view to avoiding fluctuations in the future, additional excavators and dumpers are being purchased locally. This will speed up advance stripping and facilitate large-scale operations. An additional ropeway loading station is also under consideration.

#### Dominion Reefs To Step Up Uranium Slimes' Treatment

Following the report that trial runs had started at the Dominion Reefs (Klerksdorp) uranium plant during the quarter ended June 30, 1955, it has been announced that tests have indicated the plant's capability of treating uranium slimes in excess of its 40,000 tons designed monthly capacity. Accordingly permission has been received from the Atomic Energy Board to operate the plant to its full working capacity by supplementing the slimes fed from the existing dump with newly mined ore of no appreciably lower grade. It is reported that steps are in hand to expand the underground operations of the mine.

The company's contract has also been extended to ten years from the date of certified full production, or to December 31, 1965, whichever is earlier. The period of redemption, however, remains unchanged.

#### Inco's Higher Earnings

Half-yearly figures to June 30, 1955, published by the international Nickel Company of Canada disclose a substantial rise in earnings per common share—after preferred dividends—to \$3.04 from \$2.16 during the previous corresponding period. After all charges, including taxation, earnings for the six months in U.S. dollars advanced to \$45,329,911 from \$32,586,185.

Figures in respect of the June quarter of the current year showed net earnings of \$24,651,663 against \$16,539,248. This represents \$1.66 per share as compared with \$1.10 per share for the same period of the year before. It is emphasised that earnings during the three months ended June 30 benefited from higher prices received for copper. Mr. John F. Thompson is chairman.

#### Aluminium Pays 55 Cents

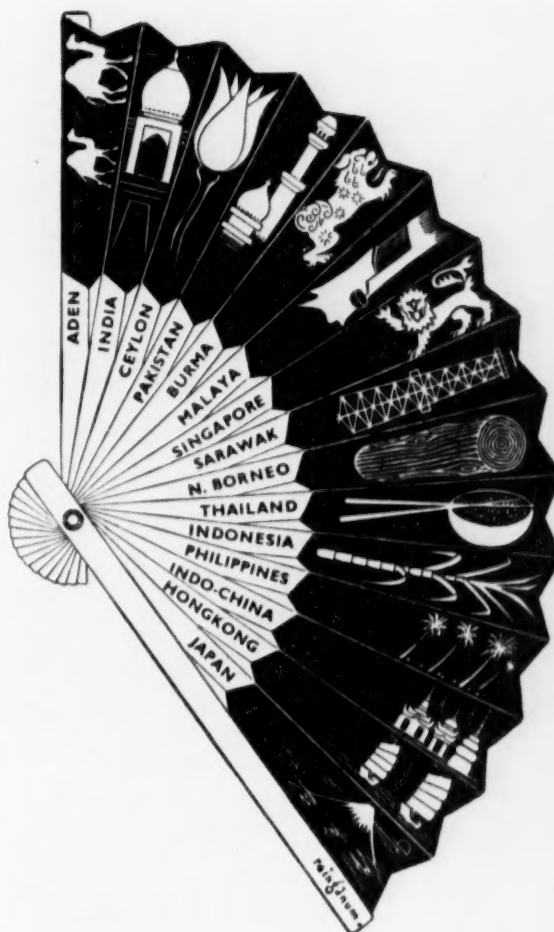
On the basis of 9,957,234 shares outstanding at June 30, 1955 Aluminium Limited's profit per share for the first six months of the current year ending December 31, 1955, represented \$2.33 per share as compared with \$1.88 in respect of the previous corresponding period. A quarterly dividend of U.S. 55c. per share has been recommended. This compares with a first quarterly dividend of 50c. which together made up total dividend disbursements of \$10,196,754 as compared with \$8,853,385 at the U.S. 50c. rate on the smaller number of shares outstanding in the preceding year.

#### Gold and Base's Unproved Ore Reserves

Following the preliminary profit figures issued by Gold and Base Metal Mines of Nigeria recently in respect of the year ended December 31, 1954, the full report and accounts now received disclose a considerable improvement in ore reserves. In respect of tin the figure of proved tonnage which includes both the Plateau and Liruei Areas has risen to 5,437 l. tons from 4,188 l. tons. In addition a most outstanding advance was made in proved reserves of columbite which rose to 435 s. tons from only 151 s. tons.

Some interesting information has also been given regarding the position of advances from the U.S. Government for the columbite development programme. At the final dates these were £185,250 as at June 30, 1954 in respect of Liruei and £55,345 as at December 31, 1954 for the Rishi Area. These loans bear interest at the rate of 5 per cent per annum on any unpaid balance up to final repayment dates of June 30, 1956 and December 31, 1956 respectively. Repayment is being effected in shipments of columbite at bonus prices and as at August 15, 1955 a total of 42 s. tons had been shipped in reduction of the Liruei loan having an approximate value of £87,000.

At the meeting of the company to be held in London on September 7, it will be particularly interesting to hear what Major-General W. W. Richards has to say about the future for columbite prices now that U.S. purchasing in the open market has ceased.



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### Ex-Lands Nigeria's Dragline

In his statement to shareholders of the Ex-lands Nigeria for the year ended December 31, 1954, Major-General W. W. Richards referred to the disappointment which had been experienced with regard to the company's Monighan Dragline. Arrangements, he said, had been made for an engineer from the manufacturers to supervise the installation of replacements now in transit to the property. It was hoped to have the machine working within the next two months. The estimated production from this dragline unit is upwards of 230 tons of tin per annum, an output which should considerably augment the company's earning capacity.

Operations in respect of the first half of the current year, Major-General Richards stated, amounted to 299 tons as against 325 tons during the previous corresponding period. But production would automatically be raised should the dragline shortly come into operation.

### Bisichi and the Columbite Outlook

A good idea of how the recent cessation of open market purchases for the U.S.A. stockpile will affect the fortunes of the Bisichi Tin Company (Nigeria) can be obtained from Mr. W. J. C. Richards' speech to shareholders circulated with report and accounts for the year ended December 31, 1954. As at June 30, the company had forward sales of columbite for shipment up to December 31, 1956 to the extent of 308 s. tons at an average price of £1,960 per ton. For the year 1955, Mr. Richards stated, there was very little more to sell and estimated production for the coming year was not covered by sales.

Nevertheless, despite this latest development Bisichi seems to be in a favourable position for at the current price of about £1,100 the company can produce columbite at a substantial profit. Mr. Richards believes that in the new industrial revolution—now well under way—columbite will be absorbed in increasing quantities and will provide a long-term source of profit for the company.

Production of both tin and columbite so far this year was greater than that of last year's corresponding period and profits have been well maintained. Meeting, London, August 30.

### Lake Views 1954-1955 Production

During the year ended June 30, 1955, Lake View & Star, the Australian gold producer, treated ore amounting to 731,609 s. tons as compared with 743,047 s. tons during the previous year. Tailings retreated totalled 908,836 s. tons against 643,343 s. tons. In last week's issue of *The Mining Journal*, page 188, the past financial year's production results were incorrectly stated as referring to l. tons instead of s. tons.

### Tavoy Tin Dredging—No Change

Except for small scale tribute operations resulting in the production of 7½ tons in 1954 against 5½ tons in 1953, no mining was undertaken by Tavoy Tin Dredging last year owing to the continued unsettled and insecure conditions existing in the company's mining areas in Burma. At the end of 1954 the debit balance carried forward was £19,118. Mr W. M. Warren is chairman. Meeting, London, September 8.

### Mazapil Again Passes Dividend

The Mazapil Copper Company will not pay a dividend in respect of operations in 1954, although group profits rose to £38,587 from a loss of £21,214 incurred in 1953. The preliminary statement also shows that £50,000 (nil) has been transferred to contingencies reserves and that £12,817 (£21,849) is being carried forward. The report and accounts will be posted on August 19.

### Sungei Kinta's Improved Rate of Production

Speaking at the recent meeting of Sungei Kinta Tin Dredging, Mr. Ellerton Binns, the chairman, gave an optimistic forecast of the current year's operations. During practically the whole of the first quarter, he said, the dredge was in low grade ground cutting its way to its prescribed working area. Since then, outputs of tin ore, as anticipated, have improved materially. In fact, the average monthly output for the first 5 months to the end of May was slightly better than that of the first 7½ months of 1954. In the absence of any unforeseen setbacks greatly improved results for the current year should be achieved.

### Offer Received for Zinc Investments

Offers to acquire the issued capital of Zinc Investments have been received from Argo Investments of Adelaide. But as proposals for a voluntary winding up of the company—under which a better return—should be obtained will be submitted in December, these offers have not been recommended to shareholders.

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## Mining Men and Matters

**Mr. W. E. Gooday**, who retired recently from his position with New Consolidated Gold Fields, Ltd., has been appointed Secretary of the European Section, Directorate of Recruiting, Transvaal and Orange Free State Chamber of Mines. Office address: Terminal House, Grosvenor Gardens, S.W.1. Telephone: Sloane 9224

**Mr. J. M. L. Howell** has been appointed sales manager (earth moving) of the Distington Engineering Company. **Mr. A. G. Elliott**, formerly production controller of Sheepbridge Equipment, has been appointed works engineer of the Chesterfield works of the Sheepbridge Engineering Group. **Mr. A. Wells**, previously deputy to Mr. Elliott, has become Production Controller, Sheepbridge Equipment Ltd.

**H. H. Prince A. E. de Ligne** has been appointed Chairman of Uruwira Minerals in place of R. Brasseur, deceased, and **Mr. William Pearce Morris** has been elected as his alternate. **Monsieur Jean Louis Joseph Edmond Berthelot** has been appointed an additional director.

**Mr. A. J. Ruthven Murray** has resigned as a director and a joint managing director of Trinidad Leaseholds.

**Mr. J. B. Richardson** has left for India on a professional visit and expects to be back by the end of the year.

**Col. H. T. Thornley**, managing director of J. and H. McLaren, Ltd., Leeds, a Brush Group subsidiary, is relinquishing that position on August 27 to join the staff at Group headquarters in London.

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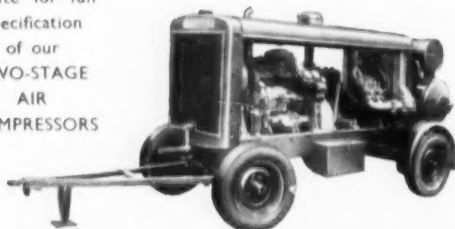
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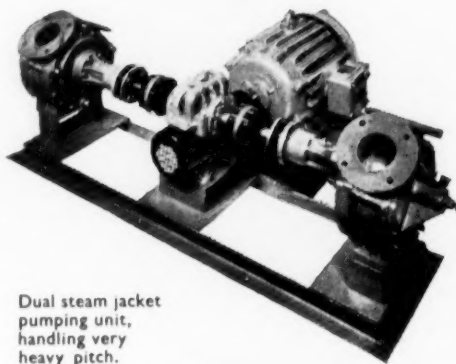
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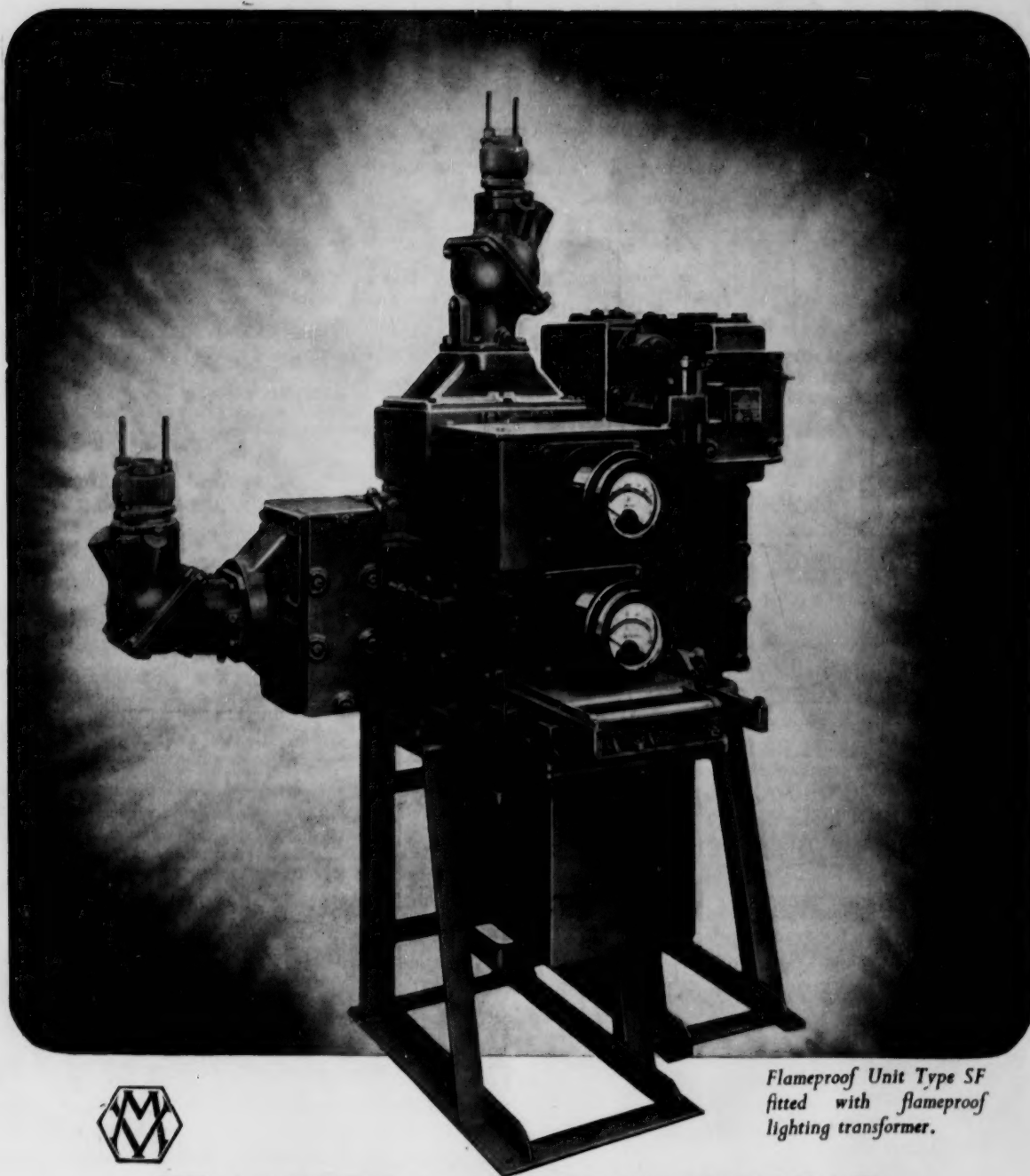
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